The Controversy over Tanks in the British Army 1919 to 1933.

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THE CONTROVERSY OVER TANKS IN THE BRITISH ARMY

1919 TO 1933

BY

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Abstract

Using hitherto unavailable official sources and dependent upcn contemporary opinion, this thesis re examines the orthodox conclusions about the tank controversy in the British Army from 1919 to 1933. In an attempt to avoid the bitterness which has characterized post war writings on the controversy, it argues, in short, that what the tank advocates were urging was not practical. The money did not exist, the vehicles did not exist and the need did not exist for the large scale tank forces for which they were calling.

The thesis examines the performances of the tanks constructed during this period and argues that they were not capable of the sort cf long range penetrative roles that were being claimed for them. The role of the cavalry in the ccntrcversy is examined and it is suggested that its officers accepted the fact that the tank would replace the cavalry in most roles.

The conclusion of the thesis is that the conventional view of the British Army's being divided over the role and future of tanks into "progressives" and "reactionaries" is over drawn and, in the main, inaccurate.

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Abbreviations

Abbreviations used in the Text and Notes

AFV	Armoured Fighting Vehicle
AP	Armour Piercing
ATGW	Anti-Tank Guided Weapon
BEF	British Expeditionary Force
bhp	Brake Horsepower
CAB	Cabinet
CID	Committee of Imperial Defence
CIGS	Chief of the Imperial General Staff
COS	Chiefs of Staff
CS	Close Support
DMO&I	Director of Military Operations and Intelligence
DMT	Director of Military Training
DSD	Director of Staff Duties
FSR	Field Service Regulations
GOC (in C)	General Office Commanding (in Chief)
GSO1	General Staff Officer, Grade 1
HE	High Explosive
HMG	Hotchkiss Machine Gun (.303 inch)
KCL Archives	Centre for Military Archives, King's College, London
MG	Machine Gun
MGO	Master General of the Ordnance
MP	Member of Parliament
MT	Motor Transport
PRO	Public Record Office
QF	Quick Firing
QMG	Quartermaster General
RA	Royal Artillery
RAC	Royal Armoured Corps
RAF	Royal Air Force
RASC	Royal Army Service Corps
RE	Royal Engineers
RTC	Royal Tank Corps
RUSI	Royal United Service Institution
SHAEF	Supreme Headquarters, Allied Expeditionary Force
SME	School of Mechanical Engineering
VMG	Vickers Machine Gun (.303 inch)
WO	War Office

CHAPTER ONE

Introduction: The Controversy

Like other wars, the First World War produced a variety of new military inventions. Among these was the tank - a machine which combined the protection of armour and the offensive power of guns and machine guns with the mobility of the internal combustion engine and the caterpillar track. Introduced into the Western Front in 1916, the tank soon demonstrated its ability to make significant gains in territory for lower losses in men and in a shorter time than any other method of attack. The tank played a predominant part in the "Hundred Days'" attacks which produced the Armistice. Reactions to the tank were mixed from the first - some saw it as a helpful adjunct to the traditional arms of cavalry, infantry and artillery while some saw in it an entirely revolutionary device which would supersede the traditional arms. The debate continued after the war in the armies of the major powers and each army produced a small group of theorists who spoke for the tank. These tank enthusiasts had the greatest success in Germany and the German Army was reorganized around armoured divisions.

The British Army did not escape the debate. The British had first used the tank in war and had developed

and proved tactics to go with the new invention. The tank controversy in the British Army was greatly complicated by the role of the Army. Unlike the armies of most of the other major powers, which were free to develop skills and weapons appropriate to major wars, the British Army had commitments all over the world which were often incompatible with preparation for major wars. Consequently, the inter war tank debate raged with greater intensity there than elsewhere because it was bound up with the debate over a continental commitment for the Army.(1) The memories of Flanders made many wish that the British should never again place a large army on the continent of Europe.

In the British Army tank development proceeded at a leisurely pace as a result of doubts about a continental commitment, the unwillingness of the governments to spend large sums cf money on Army modernization and doubts over the future of the tank. The German successes in 1940 produced an abrupt reversal of the caution of the previous years and put the tank enthusiasts in a position from which they could claim to have foretold the future. The debacle of Dunkirk and the fall of France added a venom to the retrospective treatment of the tank controversy which was absent at the time. This has produced an orthodox view of the controversy which has perpetrated a simplistic view of "prcqressives" resisted and thwarted by "reactionaries". This thesis will examine and challenge this orthodcx view of the tank controversy in the British

Army.

A number of books have been written in this subject and they are dominated by Sir Basil Liddell Hart's two volume official history of the Royal Tank Regiment. He was privy to the development, he knew intimately everyone associated with tanks, he watched the manoeuvres and inspected the vehicles and he was one of the most influential men in the development of tactics and strategy for armoured forces. But perhaps this close association may be seen as a hindrance rather than a help. Because he was so close to the development and because he lived to see his country's forces defeated by an enemy who claimed to be following his ideas, he saw the inter war tank development in terms of how it ended - his approach was teleological. He could not but see the inter war period in terms of a preparation for the Second World War. His post war writings give the strong impression that he perceived the inter war period as being a twenty year hiatus in which the British Army had to prepare for a resumption of the war against Germany on a new and higher level of technology and expertise. The tank controversy viewed from this standpoint wears a melancholy aspect: it is a tale replete with missed opportunities. Many other historians have taken the same approach.

However, there are other ways of viewing it. There is nothing wrong with perceiving the inter war period as a largely botched preparation for the next war - that is,

after all, what it finally turned out to be. But is this a fair view? It is not true to the way in which that pericd was perceived at the time. No one knew for certain that there would be another war so soon. Many may have sensed it, but no one was certain. Indeed, until 1932, the British armed services were repeatedly told that they must not expect a major war for ten years. The soldiers cannot be held responsible for a Cabinet decision. They could only do what they were told by their superiors. Because of this fact, any interpretation of the period which sees it as an opportunity to rearm against a second German attempt to conquer Europe cannot be entirely realistic - it was not so perceived at the time.

This thesis is an examination of contemporary sources and contemporary thought on the tank question. It ends in 1933 for two reasons. The first is that 1933 may be taken as a convenient dividing point - before that year, there was a reasonably high degree of confidence that the future did not hold a major war. After that year, the rise of Hitler and the activities of Italy and Japan became more obvious and could not be ignored. The ten year rule was finally abandoned showing that the climate had changed and that no one dared be certain of peace for the near future. The period of "true peace", both in actuality and psychologically may be said, so far as such distinctions may be made, to have ended in 1933. There is a second reason. There was a policy which directed tank development and this policy had been largely fulfilled in

1933 with the formation of the 1st Brigade, Royal Tank Corps. By 1933 a decision had been reached regarding tank formations and their use in war and, although many details remained to be solved, the peace time organization and employment of tanks had been largely settled. Generally speaking, after 1933, with the growing threat of war, the tank cadre was expanded (and not very efficiently) as planned. Therefore, for these two reasons, 1933 marks a convenient stopping point to this study of the tank controversy in the British Army in peacetime between the wars.

Armed with hitherto unavailable documents, and with a point of view that attempts to see the controversy in its setting, free from hindsight, this study suggests a number of new conclusions. The most important is simply that what the tank enthusiasts were calling for was <u>not practical.</u> The tank enthusiasts wanted the British Army to be thoroughly and quickly mechanized with a large proportion of its forces organized into armoured units. This was completely unrealistic between 1919 and 1933 (and for a good while after): the machines did not exist, the money did not exist and the need did not exist.

The material has been handled thematically because this work is the history of an argument. The tank controversy was a continuing debate and it breaks down into themes. Were tanks useful and in what way? What sort of tanks should be built? How should they be

organized? What are they to do? What did the cavalry have to do with the tank controversy? The chapters deal with these matters.

Chapter 2 argues that the First World War tank experience did not offer a conclusive lead for post war tank development; that the governments were not prepared to countenance an expensive programme of Army modernization; that the near impossible scale of responsibilities of the Army greatly cut into whatever programme cf modernization the governments would permit; that the Army (and the other Services) was expressly ordered by its civilian superiors not to think about, plan for or organize for a "great war" against a first class power - the only war in which tanks would be really essential.

Chapter 3 outlines the reasons for having tanks and shows, contrary to many of the opinions expressed above, that there was no objection in the Army to tanks. It also deals with the increasing doubts about the tank's future that resulted from developments in anti-tank weapons and the failure of the Vickers Medium.

Chapter 4 is probably the most important chapter because it deals with the most important matter - the tanks themselves. It is argued that the tank possessed by the Royal Tank Corps - the Vickers Medium - was not adequate for its tasks; that no satisfactory replacement was available. The rise of the light tank will be

described and the reasons for its rise given.

Chapter 5 deals with the problems of organizing tanks and describes the various experimental formations which were tried out. It will be shown that, although final decisions were not yet possible, by 1933 the British were set on their doctrine of all tank forces which they were to hold until the war.

Chapter 6 discusses the beginnings of operational doctrine. Although these were not complete by 1933, once again, the groundwork had been laid for tanks being reserved for dramatic dashes and wide circling movements.

Chapter 7 treats of the cavalry and why it was kept. It is argued that the British reduced their cavalry (in 1933 it was a third of its 1914 strength) and that the cavalry was retained, not for sentimental reasons, but for practical and sensible reasons. It will also be demonstrated that the tank pioneers themselves were prepared to retain the cavalry for a modest role right to 1933. It will be argued that the picture of cavalry men opposing tank men is overexaggerated and, in the main, quite inaccurate.

In the conclusion of the thesis (Chapter 8) it will be argued that there was a clearly worked out and consistent policy on tanks and that this policy was adhered to. It will be argued that it was a reasonable policy and probably, given the situation, an inevitable

and unavoidable one.

In the simplest terms, the argument of this thesis is that what was done was thought to be the best thing at the time. And it is hard to see how it could have been different.

It will be noted that the Vickers Medium tank is continually referred to in what follows. The Vickers Medium is vital to an understanding of the controversy. From 1923 until 1933, the important years for the controversy, the Vickers Medium was the only tank the Corps had. The tank theorists had to prove their contentions and they had to prove them with that tank. If it was toc slow, or too vulnerable, as it will be shown to have been, their arguments lost much of their force as a result. The Vickers Medium influenced every major step in the formaticn of British tank thinking - the fear of anti-tank guns, the rise of the light tank, the conviction that tanks were too complicated for conscript armies to learn, the development of orderly (and perhaps over orderly) tactics - all owed their origin to that tank. After the money situation, it was the most important single factor in the tank controversy.

CHAPTER TWO

The Background Factors Affecting the Controversy

Like other historical problems, the tank controversy took place in a certain, unique historical context. Had certain facts not been true in the background of the controversy, the progress of mechanization in the British Army would have taken a very different course than it did. The tank had been invented and designed for a certain specific use; it was a solution to a particular problem at a particular time although men with vision might read another future for it. It was a solution to the military problem of the Western Front as it revealed itself to be in 1915 and the development of the tank was shaped in that event. Therefore, when the tank controversy began after the war, the tank already had a history from which conclusions could be drawn for the future. The tank's activities in the First World War is the first of the background factors which must be made clear. The war had cost the United Kingdom a great deal of money; thousands of millions of pounds were spent and great damage was done to her investments abroad and to her principal sources of income. It was therefore imperative that the post war governments make every endeavour to economize so that Britain's financial affairs could be set straight and her massive debts paid off. The second of the background

factors was the constant pressure for economy that all government departments felt and, not least, the pressure on the Army. The war, at such a cost of blood and treasure, had done at least one thing: Britain had rid herself of her great enemy. It appeared that, for the first time in many years, Britain could look to a future free from the threat of a great war. This is the third of the background factors: the officially given decision that the Armed Services should plan on the assumption that there would be no great war in the immediate future - the Ten Year Rule. The end of the war presented the British Army with many new responsibilities and the combination of the drive for economy and a balanced budget ensured that the Army would be too weak to fulfil these massive new duties. This is the fourth background factor: the British Army's weaknesses in coping with its day to day problems.

These four background factors are the legacies of the war that created the tank, the war that cost Britain so much, the war that destroyed her greatest enemy, the war that created turmoil that made the Army's problems so much greater.

These four circumstances had their effect on the tank controversy. The tank's history was short and the lessons from that history were not clear to all; the tank was so expensive a weapon that thrifty governments were unwilling to pay for very many; the tank was principally a weapon for that great war for which the Army was told not to

prepare; the tank seemed little use for the Army's role of keeping order over a quarter of the world. These four factors are too often omitted in accounts of the tank controversy in the British Army between the wars. The fact was that these four inflexible facts reduced the tanks to possibly the lowest position in the Army's long list of priorities.

The Tanks in the War

A necessary prerequisite for understanding the background to the tank controversy is a brief account of the tanks in the First World War. The war was the only practical experience which the Tank Corps had to form its opinions and desires for further development. Two pitched battles stand out in the war time history of the Corps: Cambrai in 1917 and Amiens in 1918. Only in these two battles were there large numbers of tanks used as the planners in the Tank Corps wanted them to be used. The battles share a common structure. In each case there was no preliminary bombardment and, probably as a result, in each case there was surprise. The first day of each battle saw substantial gains in ground, material and priscners for relatively low casualty returns. In each case, after the first day, the impetus of the battle slowed as tank casualties mounted although Amiens was a greater success than Cambrai partly because German morale was lower. Each battle produced heavy casualties among

the machines but, in each case, it seems that these casualties were caused more by mechanical failure than by enemy action. In what follows, a very brief account of each battle will be given, followed by figures supporting the conclusions that tanks represented a great economy, that their casualties were very high and that these casualties, in most cases, were probably not caused by the enemy guns. The symmetry of the two battles extends further for each gave rise to a mythical event; one was "pro tank" and the other was "anti tank". The tank men saw the breakaway action of the lone Whippet tank, "Musical Box", as an example of the future; those who arqued against tanks saw the exploits of the German gunner at Flesquieres Ridge as showing how vulnerable tanks really were.

The first major tank action in history was the battle of Cambrai in November 1917. The plan for the battle had its origin in a suqgestion by J.F.C. Fuller, the Tank Corps' GSO1, for a tank raid on St. Quentin but, when finally determined upon, the small scale raid had become a large scale attack involving about 380 tanks, six infantry and four cavalry divisions. The Tank Corps developed a complicated tactical drill which was accepted by all but one of the divisional commanders.(1) The attack began on the morning of 20 November with a short hurricane bombardment which caught the Germans completely by surprise. By noon it was clear that something unprecedented on the Western Front had happened. The

assaulting troops had advanced nearly five miles on a 13,000 yard front capturing 8000 prisoners for losses of about 4000. After this first success, the battle continued for about a week with minor gains. At the end of this period, the British commanders judged the battle to be over, withdrew what tanks were left and settled down to enjoy their new positions. However, the Germans counter attacked on 30 November and, by 7 December, had qained back most of the ground lost on the first day and equalized the casualties. The battle that had begun so promisingly had ended in the usual disappointing stalemate.(2)

A year later was fought a greater tank battle which had longer lasting results. The great German offensives of March and April 1918 had left a vital railway line threatened in front of Amiens. It was determined by the Allied High Command that a tank attack would be launched in order to push the Germans away from Amiens and recover as much of the old Allied trench line as possible. About 600 tanks were assembled with most of them going to support the Canadian and Australian Corps. The flanks of the attackers would be held by the British Third Corps to the north and the French XXXI Corps to the south. The attack began at dawn on 8 August and, as at Cambrai, the absence of long preliminary bombardments secured surprise. By evening the attackers had advanced seven and a half miles for about 5000 casualties; German losses were in the range of 27,000 men and 400 guns. Allied attacks

continued until the 11th and, this time, there was no German counter attack.(3) From this battle until the end of the war, tanks were constantly in action along the whole Western Front in support of the unceasing Allied attacks. The battle of Amiens was a considerable shock to the Germans and Ludendorf described it as the "black day of the German Army".(4)

In these two battles three conclusions stand out. Tanks, in sufficient quantities and properly handled, resulted in a great savings of lives, time and effort: each of these battles, on its first day, achieved results that the conventional pattern of infantry-artillery battles took months and hundreds of thousands of lives to gain. Seccnd, tank attacks, if properly planned, were usually successful: no adequate defence against them was developed by the Germans. Third, casualties among the tanks themselves were very high: 40% to 50% per day were destroyed or became disabled. These three conclusions are important for they were to reappear in the post war debates. The First World War represented almost all the experience of tank fighting that the British Army was to have until the next war and continual references were made to the "the lessons of the war" in the post war years.

The Tank Corps had always claimed that, given a chance, tanks would save lives and so it was found to be. The first day of the battle of the Somme in 1916 had cost the British Army 60,000 casualties (5); in return, the

line had been advanced one and a quarter miles at most. The first day at Cambrai saw gains of five miles for 4000 casualties. An equivalent gain at the third battle of Ypres in 1917 took three and a half months and cost some quarter of a million British casualties.(6) The battle of the Somme in 1916 lasted about five months and saw more than 400,000 casualties for an equivalent gain in territory.(7) The first day of Amiens gained seven miles at a cost of 5000 men; 20,000 men were killed on 1 July 1916 for an insignificant gain in ground and 2000 German prisoners. At Amiens the Australian Corps had 83 men killed (8); on the Somme over 600 men of the Newfoundland Battalion were casualties.(9) There can be no doubt whatsoever that the tanks saved thousands of lives in the First World War. A square mile of ground gained by the British cost 5,277 men in 1916, 8,222 in 1917 and, with the greater use of tanks, 86 men in 1918.(10) So effective and so economical were tanks that Sir Eustace d'Eyncourt (one of the "fathers" of the tank) suggested in a memorandum in 1917 that one tank with a crew of eight or nine men was worth 400 infantry men in an attack (11) and Haig "having regard to the proved utility of tanks" recommended in mid 1917 a doubling of the Tank Corps.(12)

Not only were tanks effective but also they represented a savings in money. Because a tank was relatively unaffected by barbed wire, the long artillery bombardments designed to cut the wire could be dispensed with. Assuming the average price of a shell to have been

3 Pounds, the preliminary bombardments at the first battle of the Somme, the battle of Arras and the third battle of Ypres had cost a total of 7,250,000 Pounds. This sum, at 5,000 Pounds per tank, would have bought 3500 tanks or, with one tank being used four times, 14,000 tank "sorties". Since the first days of Cambrai and Amiens were conducted with less than 1000 tank sorties, the effect of another 13,000 sorties is difficult to imagine.(13) The clear conclusion of these two tank battles is that a one day tank battle would gain results that would cost several hundred thousand less lives, three or four less months and two or three million less Pounds than any other method. The rapid expansion of the Tank Corps is proof that these facts were recognized by the High Command.

The tanks saved lives among the attacking infantry but they themselves suffered heavily. One of the reasons why Cambrai had had such a disappointing ending was that, after the first few days, there were virtually no tanks left and the battle had become an infantry-artillery assault with all the usual problems of high casualties and impossible communications. At Amiens too, there were few tanks left by the end of the battle. At Cambrai 378 tanks were available (although not all were used) and by the end of the day 179 were out of action - 47.35%.(14) At Amiens 270 out of 415 fighting tanks were lost - 65.06% - on the first day. The second day of Amiens saw 39 of 145 disabled or destroyed - 26.9% - the third 30 out of 67 -

44.78%.(15) That is an average of 45.58% of tanks destroyed or disbled per day of attack. Enemy gun fire accounted for only part of the total. At Cambrai on the first day 36.31% of the casualties were from hostile fire, the rest were a result of mechanical problems or ditching.(16) At Amiens the proportion of enemy inflicted casualties rose day by day - 37.04%, 50% and nearly all of the casualties on 10 August - as the German gun crews qained in skill and the attacking troops tired.(17) The rhomboid tanks were very delicate and prone to breakdown and they had not been built to last.(18) Between 8 August 1918 and the Armistice there were 1995 tank sorties; 887 tanks became casualties (44.46%) but the majcrity of these were reissued and, in fact, only 89 (4.46%) were permanently knocked out.(19) These figures suggest that the majority of tank casualties were breakdowns, ditchings or other mishaps and not the result of enemy action.

The greatest enemy of the early tanks was their own mechanical unreliability and not the enemy guns. The German gunners seem to have been neutralized and put out of action by a combination of the speed and surprise which tanks achieved and the hurricane bombardments which preceded the attacks. The war experience did not provide a definite answer to the question of how effective artillery would be against tanks and there was no guide for the post war controversy in this respect. Guns had achieved a success against tanks at Flesquieres Ridge in the battle of Cambrai (20) but at the Messines Ridge on 7

June 1917, the preliminary bombardment was found to have destroyed the five anti-tank guns that had been placed there.(21) Indirect fire stopped the French tanks at le Chemin des Dames but failed to do so at Laffaux (5 May 1917) or at Malmaison (24 October 1917).(22) In balance, it would seem that guns were not especially effective against tank attacks but this may be because the Germans did not take tanks seriously until it was too late for them to develop counters to them. Certainly accuracy of gunnery left something to be desired: on 31 July 1917 a British tank spent 30 hours under continuous fire without being hit once (23); another tank held out for 72 hours against fire from both sides without being put out of action.(24) Even when a tank was hit there was sometimes no damage - a tank officer told of a German shell's entering his tank's roof and exploding inside; the only damage was a "scratched finger".(25) At Cambrai a tank which had moved ahead of its infantry charged a battery and destroyed four guns without mishap.(26) It seems therefore, that gunnery as practiced by the Germans in the War did not prove to be an effective antidote to tanks and, in fact, that there was very little that they were able to do in the face of a tank attack. But it cannot be denied that the Germans did not foresee the challenge of the tank - Cambrai, as seen from their side, did not suggest that the tank was much to fear. In 1918 they began to pay more attention to the problem and they began to develop tactics and weapons but the war ended before

they could prove these in battle.(27)

It seems that the tanks could claim, at the least, to have hastened the end of the war. The Supreme War Council "considered that there was no possibility of the Allies qaininq the final decision or even a substantial victory in 1918".(28) The battle of Amiens was a tank battle and would not have had the same results had the tanks been absent and Amiens seems to have been a decisive factor in the collapse of German morale. The First World War proved the utility of the tank under the conditions of the Western Front and demonstrated that the high tank casualties were not primarily caused by enemy countermeasures. The question that remained in 1919 was whether the lessons of the First World War were a guide to the future. Was the pattern that emerged from the tank battles a pattern that would be followed in different conditions at a later time?(29)

The Pressure of Economy

No consideration cf the background of the tank controversy can be complete without some consideration of the attempts continually being made to reduce Army expenditure. These reductions as they affected the Tank Corps will be referred to throughout this work but it is appropriate to describe the two major economy drives between the wars. The first of these ran from the end of

the war until 1924/1925 and reduced the Army from its extraordinary war time levels to a level at which it was to remain until the Great Depression. This period included the famous "Geddes Axe" instituted by a government fearful that reduction was not proceeding fast enough. The second cut - the May Committee and the temporary cuts - was a result of the financial and economic crisis of 1931. The Army was under continual pressure to reduce its expenditure and then to further reduce it with the result that, from 1919 to 1932, each year's Army Estimates was lower than the previous year's. The Estimates rose in 1933 and 1934 but only back to the level which preceded the May Committee cuts. From 1926 to 1934, the Army had an average of less than 40 million Pounds a year to spend of which about 8 million was spent on non effective services (pensions and the like). Every arm of the Army was under pressure and not least that newcomer, the Tank Corps.(30)

The Army Estimates of 1919/1920 inform us that the British Army (exclusive of India) stood at two and a half million men costing the taxpayer over four hundred million Pounds.(31) It was imperative that these figures be reduced as soon as possible and by 1924/1925 the Army contained 161,000 men and cost about 45 million Pounds. A Treasury memorandum of 1921 pointed out the facts of the matter. The maximum government revenue in 1922/1923 would be 950 million Pounds; debts created by the war would necessitate payments on principal and interest of 465

million; that would leave 485 million available for Supply; the Supply Estimates of 1921/1922 had been 974 million; neither taxation nor public debt could be increased; therefore, the Supply Estimates must be reduced. (32) In this reduction the Army was expected to play its part.

In the Army Council in 1920 Churchill (33) stressed the need for economy on the 1921/1922 Estimates and the Council agreed to reccnsider its needs; in a further meeting Churchill stated that the non fighting services must be reduced by three or four million Pounds. (34) When Churchill left office, he had left behind draft Estimates of some 119 million but this was not good enough; the Army Council had subsequently reduced the Estimates to 113.6 million but that was not good enough. That sum had been divided between 32.3 million Pounds for the Middle East (which the Foreign Office was expected to return to the War Office) and 81.3 million for other Army expenses. The first figure must be cut to 30 million and the second to not more than 78 million Pounds. And this was only the beginning. Among a list of proposed reductions, the Army Council agreed to cut 3000 horses and three cavalry regiments, 100,000 Pounds from the tanks and another 100,000 Pounds from the Army Technical Schools. (35) However, by May 1921, only 1200 horses had gone and the cavalry regiments had not begun their reduction. (36) Next month the Army Council was told of "the necessity for drastic reduction" in the Estimates. The Secretary of

State for War (37) demanded reductions of 10 million Pounds (this not to include the Middle East) and ordered each member of the Council to consider how he could make a 15% cut in his department. Appended to the minutes of the meeting was the Treasury report already mentioned.(38) In November 1922, the Secretary of State (39) demanded cuts of 6 million Pounds of which the fighting part of the Army had to find 3 million Pounds.(40) Further reductions were made in the 1924/1925 Estimates but when the Secretary of State, acting at the Chancellor's request, asked whether further cuts could not be made, he found that, in the opinion of the Military Members, "no further reductions could be made without prejudice to efficiency."(41) Nonetheless, the pressures were too strong for the soldiers to resist and, between, 1924/1925 and 1931/1932, the Estimates drifted down a further five million Pounds a year and a further 12,000 men.

In order to supervise the post war reductions, the government had set up a committee under Sir Eric Geddes (42) which repcrted on February 1922 on possible economies in the Supply Estimates. In the debate in Parliament which followed, the Chancellor of the Exchequer stated that the Committee had recommended a savings in the Army of 15.5 million Pounds and 39,000 men; the Army had actually reduced by 17 million and 33,000 men.(43) In its examination of the Army, the Committee had asked the Army Council scme searching questions. It was suggested that the Cardwell System might not be an economical relief

system and the War Office was asked to consider an alternative. It seemed to be the intention of the War Office to have a pre war scale Expeditionary Force (44) notwithstanding the fact that there was no longer a German Army and that there was now a Tank Corps and an Air Force. Why was there a pre war ratio of cavalry to infantry and what kind of savings could be made if the cavalry were to be reduced by half? Why were there four infantry battalions surplus to the Cardwell requirements? Why were there three Household Cavalry regiments and could they not be reduced to one? The Committee concluded by asking for a statement on the future of mechanization:

> The Tank Corps is a new arm of the Service... The Committee would like to know what savings have been realized in other arms of the Service through the adoption of this form of mechanical warfare, and what will be the total cost, including provisions of tanks, of the Corps in 1922/1923.

These were important and difficult questions; unfortunately the Army Council did not answer them: reductions in cavalry, the future structure of the Army and savings through mechanization all depended on the tanks:

> As soon as satisfactory designs of tanks can be approved and sufficient numbers produced, further reductions of other arms

will be considered.

The existence of the Tank Corps had already allowed four cavalry regiments to be disbanded and the Corps' cost in 1922/1923 was expected to be 1.8 million Pounds of which half a million was to be spent on material.(45)

Although disappointing, the answer was reasonable enough for there were no tanks in the Corps at that time except for a number from obsolete war stocks and further consideration obviously did depend on the Tank Corps' getting a decent machine.(46) But it is a pity that the Army Council did not say just why the 1914 establishment and the Cardwell System were being retained.(47)

After the Geddes Committee reductions the Estimates continued at about the same level until 1931/1932. In 1931 another economic crisis occured and again a committee was created to oversee spending cuts. The May Committee recommended reductions of some four million Pounds in the Service budgets, to this the Labour government added a further cut of some five million for a total of about nine million Pounds. Before any further action could be taken, the Labour government was replaced by the National government. The new cabinet reduced the Air Force's reduction to about 500,000 Pounds so that the total Service reduction demanded was about 8,600,000 Pounds.(48)

The reductions which were expected from the Army confronted the Army Council on 31 August 1931. These were now in two parts. The May Committee had proposed a

permanent cut of 1,693,000 Pounds and to this the Council agreed although it reserved to itself the right to make the savings in the areas it chose.(49) The second part was a government recommended temporary reduction of 2,000,000 Pounds. The Council agreed that this could be realized by "standing fast" for one year.(50) In conclusion, the Army Council pledged itself to reductions totalling 3,683,000 Pounds. The May Committee's reductions were to come chiefly from a 1,255,000 Pounds reduction in the pay of officers and men. It was determined that up to 2,108,000 Pounds could be shaved off expenditure by standing fast.(51)

When the 1932/1933 Army Estimates appeared they duly showed a reduction of 3,442,000 Pounds - slightly less than promised although, when actual expenditure was calculated, the total savings were found to be about 3.8 million Pounds. These cuts were spread fairly equitably and did not affect the RTC too much: RTC Central Schools were down about 8%, Tracked and Half Tracked Vehicle Expenditure down about 10% and the experimental establishments were about the same while petrol expenditure had increased about 4%. Next year, most of the temporary cuts were lifted and the Estimates increased by about 1.4 million Pounds. After 1933/1934 the Army Estimates began to creep higher until a large increase of 13 million Pounds in 1937/1938 saw rearmament begin in earnest.

The Ten Year Rule

In some respects, the most important of the conditions within which the tank controversy must be considered was that official principle which has come to be known as the "Ten Year Rule". The burden of this principle, within which the Service Estimates had to be framed, was that no major war involving the United Kingdom was likely within the near future. Broadly speaking, the history of this assumption was as follows. It was introduced in 1919 as a guide for the next year's defence estimates, was extended one by one to each of the Services and in 1928 was formally adopted by the Committee of Imperial Defence as a guiding principle of expenditure which it remained until abandoned in 1932. The Ten Year Rule has incurred some controversy and has even been cited as being to blame for the deficiencies of British defence in the middle and later 1930's.(52) Whether or not such an extreme view is justified, the rule, at least in its first years, was a reasonable and even necessary assumption and, certainly before the early 1930's, there was little prospect of Britain's becoming involved in a major war.

It first made its appearance at a meeting of the Cabinet Committee on Finance on 11 August 1919. The Fighting Services were to be required to draw up fresh Estimates based on the assumption that no "great war" was to be anticipated within the next ten years, that the

"principal responsibility" of the three Services should be the maintenance of order in the Empire and that the "utmost should be made of air power and other mechanical devices in order to save manpower".(53) A few days later, the War Cabinet agreed to a very similar provision adding to the earlier decision (among other points) that no Expeditionary Force was required for a great war and that "in framing the Estimates, the following maximum figures should be aimed at:- Royal Navy 60,000,000 Pounds, Army and Royal Air Force 75,000,000 Pounds".(54) Of interest in these two earlier versions of the rule is a provision absent from later ones, that use should be made of mechanical devices in order to conserve manpower. These two rules were to apply to the next year's Estimates only and there is no reason to suppose that it was anticipated that the "Ten Year Rule" would become a primary principle of British defence policy. Indeed, Hankey's opinion was that "the decision of the Finance Committee has been interpreted rather more widely than was intended".(55)

After 1919 the principle that no major war was to be expected for ten years was extended to each of the three Services without becoming a general basis of Estimates for all the Services. In 1925 the CID accepted the view of the Secretary of State for Foreign Affairs that

> in existing circumstances, aggressive action against the British Empire on the part of Japan within the next ten years is not a contingency to be seriously

apprehended.

To this the Cabinet agreed a month later.(56) In 1925 the Cabinet accepted the report of a sub-committee postponing a programme of air expansion until 1935-1936.(57) In 1927 the Cabinet agreed

> that it should be assumed for the purpose of the Estimates that the British Empire will not be engaged in a European War during the next ten years and that the immediate plans of the Army should be based upon preparedness for an extra-European War.

The CID took note of this Cabinet conclusion in 1928.(58)

The Ten Year Rule proper, that is to say, a provision affecting all Services and one which moved forward day by day was adopted by the CID in 1928. In that year Winston Churchill as Chancellor of the Exchequer asked the CID to consider adopting his proposal

> That it should now be laid down as a standing assumption that at any given date there will be no major war for ten years from that date.(59)

This matter was discussed at a meeting of the CID held on 5 July 1928. Churchill observed that a ten year period had been mentioned before in the Committee as a "rough guide" for naval or military preparations and that he now wished to see such a principle regularized and advance "day by day" with an annual review. After considerable

discussion, in which Sir Austen Chamberlain, the Foreign Secretray, stressed the difficulty if not impossibility of prediction, the Committee accepted Churchill's suggestions. The Committee agreed

> That it should be assumed, for the purpose of framing the Estimates of the Fighting Services, that at any given date there will be no war for ten years.

Two other conclusions laid down the principle of annual review and stressed that any department of the British government or any Dominion government could, at any time, ask the CID to review the conclusion in the light of changed circumstances.(60) The CID reaffirmed its conclusion in 1929, (61) 1930 (62) and 1931 (63) with little discussion although the Foreign Office registered a mild caveat in 1931.

In 1932 a near unanimous attack was made on the Ten Year Rule in the Committee of Imperial Defence. MacDonald suggested that the Committee should accept the recommendations of the COS Committee (that Committee had devoted virtually the whole of its annual report to an attack on the rule) and report them to the Cabinet "who would consider them on the understanding that the matter could not be allowed to drift". Accordingly, after some further discussion, the Committee agreed in exactly the words of the COS Subcommittee:

> (1) That the assumption governing the Estimates of the Defence Services, that

from any given date there will be no major war for ten years, should be cancelled.

(2) That a start should be made in providing for commitments which are purely defensive, including the defence of bases. First priority should be given to requirements in the Far East...

(3) That a decision should not be delayed until the results of the Disarmament Conference are known. Recent events in the Far East are ominous. We cannot ignore the Writing on the Wall.(64)

"No dissent was expressed" by the Cabinet from this decision when it met on the next day although it was stressed that "this must not be taken to justify an expanding expenditure by the Defence Services without regard to the very serious financial and economic situation that still obtains".(65)

And so the Ten Year Rule ended - two years too late.

Post War Responsibilities of the Army

Between the wars the British Army was trapped in an ever tightening vise: the war had left, on the one hand, a legacy of increased responsibility for the Army and, on the other hand, an inflexible demand that costs be pared as closely as they could be. Because the Cabinet ruled in

Britain and because it was a Cabinet of civilians, the Army was dictated to on the matters of both its responsibilities and its assets. A consideration of the Army's duties and its capacity to carry out these duties will complete this examination of the parameters within which the tank problem must be seen.

The post war settlements left the United Kingdom with greatly increased responsibilities most of which fell to the Army tc grapple with. Roughly speaking, Britain was left with all the responsibilities that she had had in 1914 (except that of the German threat) and new ones of the mandated territories in the Middle East, vague but potentially large commitments as a result of the various European pacts and the League of Nations.

The mandate was a new idea. Germany and Turkey had had extensive possessions and these had been taken from them by the peace treaties. In order to disarm the charge of "imperialism" or "colonialism" the notion of a mandate was invented which allowed the imperial powers to take these colonies and "lead them by the hand" to self-government.(66) The German Empire in Africa was divided among Britain, France, Belgium and South Africa and her Pacific Ocean possessions went to Australia, New Zealand and Japan. Britain's acquisition of her new African mandates caused her little trouble but it was not so with her ex-Turkish territories. These, for the most part in the Middle East, were divided among France and Britain

with the creation of a new Arab state. As is well evidenced today, these were troubled areas and the situation was not improved by the Balfour Declaration establishing a "Jewish Homeland" and the vague and imprecise promises made to the Sherif of Mecca concerning an Arab self governing nation. Britain's share consisted of all or part of modern Israel, Jordan, Iraq and Persia with a paternal interest in Saudi Arabia and the Gulf States.(67) These mandates were to cost Britain much and profit her not at all. So troublesome was Palestine that British policy was described as simply a matter of "hoping...that something will turn up."(68)

The vague promises of Locarno and the League of Nations and the increase of nationalism in her possessions and mandates, combined to create a strategic situation that was full of menace for Britain. These and other strategic pressures were summed up by the General Staff in 1927:

> The situation as it exists today, shows a very different picture <from the 'more clearly defined' one of 1914>. Though the danger of another European war, in which we should be called upon to participate is remote, we have accepted certain liabilities under the Pact of Locarno which demand the maintenance by us of military forces adequate to meet this obligation. In addition, not only have we

> accepted mandates for large territories, such as Palestine and Iraq, for the defence of which we are pledged, but, in the general upheaval of the world which has resulted from the war, our military liabilities in the East have been considerably increased by such disturbing factors as the Russian revolution, the chaotic condition of China, the growth of the Swaraj movement in India, and the political ambitions of an independent anti-British Egypt. Added to all this we have the problem of maintaining the internal security of our own country against subversive activities which are largely prompted and financed by Russia, and which have shown, in the General Strike of 1926, what proportions such a danger can very rapidly assume. (69)

There was no lack of things for the British Army to do between the wars. It may have been a time of peace for the country as a whole, but for the Army it was not. Between 1918 and 1933 the British Army had extraordinary problems in Russia, Ireland, Germany, Turkey and China. In addition it was wholly or partly responsible for the peace in India, the North West Frontier, Palestine, Egypt, the Sudan, Mesopotamia, Iraq, Persia, various colonies and bases scattered throughout the world and internal problems

connected with labour unrest at home.

How well equipped and manned was the Army for all this? A report from the CIGS in 1923 (70) gives the answer for that year. At the time, the British Army had forces stationed in Britain, Ireland, on the Rhine, near Constantinople, in Egypt, in Iraq and in the Colonies.(71) There were, of course, forces in India as well. In the case of local hostilities developing in these places, reinforcements varying in size from two divisions to fourteen divisions would be required.(72) In 1923, there was no force in Britain fit to take the field without mobilization. Given two weeks, one cavalry brigade and two infantry divisions could be ready to sail. This force was considered adequate for trouble in Palestine; everywhere else it would be insufficient.(73)

Overall, the situation in 1927 was no better than it had been in 1923: the Army was just able to cope with its responsibilities so long as there was no trouble. A meeting of the Army Council considered what forces could be sent to India in the event of a war with the Soviet Union "necessitating operations on the North West Frontier". The total forces, arriving over six months, would consist of five infantry and one cavalry divisions - still not as many as the 1923 report considered necessary.(74) Milne (75) prepared a memorandum to the Secretary of State for War in that year protesting against further reductions of the Army:

> ...we have already reduced too much as far as the infantry is concerned, whilst, as regards the other arms, they are barely able to fill the role required of them in peace, and they are admittedly short of the reserves that are necessary to enable them to mobilize for war.(76)

The Report explained that the Expeditionary Force was organized haphazardly on the basis of the Cardwell System and bore "no relation either to the size of any particular foreign army or to any of the liabilities which it may be called upon to meet".(77) Despite the increase in her commitments, Britain's army was smaller than it had been before the war.(78) Indeed, so great was the pressure for men, that even so comparatively small an emergency as that at Shanghai in 1927 had stretched reserves.(79) Britain's greatest problem, Milne continued perhaps unrealistically, was the defence of India against the Soviet Union, but she had less than half the strength necessary to deal with this threat.(80) Turning from the infantry, the Report had this to say about the Royal Tank Corps:

> As regards tanks, we have only four battalions on a peace footing and those only partially equipped; it is improbable that we could now place in the field more than 2 battalions each with a reduced establishment of 48 fighting tanks, i.e. 96 of these weapons for our five

divisions. As the exiguous reserves of men and material thus do not meet the requirements of initial mobilization of even the existing battalions there is no means of creating additional tank units. The part that tanks are likely to play in the next war can be estimated when it is recalled that in 1918 when we had 61 divisicns on the Western Front, it had been decided to construct 8,000 of these weapons for the 1919 campaign; this would have given an average of about 130 tanks per division.

Cavalry, because of the demands of the Cardwell System, could not be reduced further.(81) Even at this, the Expeditionary Force could not be mobilized "until a considerable number of post-mobilization recruits have been enlisted and trained". Milne's conclusions were as follows:

(a) In the Near, Middle and Far East, we have greater commitments than in 1914, but we have reduced garrisons to meet them.

(b) To increase these garrisons to the minimum strength reqiired for reasonable security under present conditions would entail an additional 5 infantry battalions on foreign service. This would upset the balance of line battalions at Home and

> Abroad, and, since financial conditions preclude an increase in the number of battalions, could only be adjusted by a modification of the Cardwell System.
>
> (c) Such a modification would involve a reduction of the pool of infantry at home from which to organize our Expeditionary Force to such figures as to leave practically no margin for internal security in England. The latter problem has assumed increased importance as a result of Russian communistic activities.
>
> (d) Our present proportion of artillery and tanks is dangerously low, and any further modification in cavalry should be in the nature of a conversion of units rather than a reduction in number.
>
> (e) Any further reduction in the Regular Army will reduce still further its reserve producing capacity. This is already too low to enable us to mobilize our present British garrison in India and the Expeditionary Force within reasonable time. (82)

There was no avoiding the fact - the British Army had been given responsibilities with which, given "financial considerations", it could not cope.

This short examination of the four delimiting factors of the tank controversy - the frame of the picture so to speak - has now been completed. To none of these four could any activities of the Tank Corps or its civilian supporters have made any difference; for that matter, no one could have changed them. They were the facts of the situation. The First World War had not given a clear directive for the future development of tanks (83), economy was essential, the Ten Year Rule merely recognized the actuality of the situation and the combination of these last two ensured that the Army would be kept at a dangerously low level. Nothing could be done about it; it was the way things were. Little has been said about how the Tank Corps fitted into all this but that will be made clear in the remainder of this thesis. Again and again, we shall find these four factors crossing and recrossing the trail of the Tank Corps. It is fruitless therefore, to speak of what might have been if only there was more money. There was no more money.

CHAPTER THREE

The Utility of the Tank: From Certainty to Questioning

Logically, the place to begin a consideration of the tank controversy in the British Army between the wars is with the decision to continue with the development of and experimentation with tanks after the war. Tanks had shown their value during the war, but would they have a future, or were they merely a solution for a passing problem? In fact, there was little discussion of this point. There were two compelling arguments for tanks: they were more economical of lives and effort than other land weapon systems and they were a great deal more effective than other land weapon systems. Therefore, with little debate, it was assumed that tanks would continue to have a place in the post war Army. Granted this, of course, there were many matters of organization and design to be settled; these were the subject of much disagreement and will be considered in later chapters. But the decision to retain the tank was easily taken.

In the first flush of enthusiasm after the war, it was taken for granted by nearly everybody in the Army and the War Office that tanks offered an opportunity, by virtue of their greater effectiveness, for the Army Estimates to be greatly reduced with no loss of

efficiency. As time went on, however, this principle came to be questioned for tanks and tank units were more expensive than cther units and the promised economies never seemed to materialize. But the connection between tanks and economy was generally assumed in the first few years after the war. There was a similiar development of the conviction that tanks were so effective; towards the end of the 1920's some thinkers began to question whether the unreliabilities of the various British designs might not mean that the tank had a very reduced future. However, the greatest doubt about the value of the tank came in the later 1920's with the development of anti-tank guns. Until about 1927 the tank had seemed supreme and it had seemed that the other arms would not be able to defend themselves against tank attacks: future land warfare might become almost entirely a matter for tank fleets as many of the tank propagandists believed. But, with the appearance of a host of light rapid-fire armour piercing guns, the balance seemed to change and more and more soldiers came to the conclusion that the tank might be doomed in future battles.

Generally speaking, the arguments for tanks resolved themselves into one: tanks are more efficient. Efficiency is a combination of effectiveness and economy and the two are interrelated. Tanks were economic because they were so much more effective than other and more expensive combinations of weapons systems and their effectiveness was connected with the fact that they were so economical

of men and effort. They were, therefore, efficient. There was never very much doubt about whether the British Army would keep its tanks after the war: no one in an important position doubted that they would be useful in some role not as yet clearly established. Statements hailing the utility of the tank were made from time to time and they may be divided into two groups on the basis already mentioned. In what follows, we shall look at the widely accepted beliefs that tanks were ideal for Britain because they would save money and because they were so powerful that all future warfare would involve them in some capacity or other.

A number of attempts were made shortly after the war to examine in detail the cost effectiveness of tank units as aqainst conventional units. The first of these appeared as an article in the Tank Corps Journal in 1922. The author at some length calculated that, in fighting values, a mechanized cavalry regiment would be worth three regular cavalry units and that a mechanized infantry unit would be worth 1.65 ordinary infantry units. Adding in cost values (recognizing that a mechanized unit was somewhat more expensive than an unmechanized one) he concluded that mechanized units would be up to 60% more effective than their unmechanized counterparts for the same money. He concluded that "mechanicalization (1) provides the one sure road towards combining fighting efficiency with economy in the Army". (2) In the same year a similiar calculation was made by a cavalry officer. He

carefully worked out the costs of tank units equipped with various types of tanks as compared with a cavalry brigade. He was concerned to determine the costs of tank units which would have the same firepower as a cavalry brigade. He decided that a cavalry brigade costing 441,000 Pounds could be replaced by tank units varying in cost from 270,480 to 39,648 Pounds.(3) In 1927 a further attempt at cost efficiency calculations was made when it was proposed that the cavalry division of the Expeditionary Force could be replaced by two brigades of "cavalry tankettes" and one brigade of "artillery tankettes": this substitution would, for the same sum of money, replace the horses with 480 tankettes with a greatly increased military efficiency.(4)

The economies to be brought by the tanks were not restricted to money however and in 1919 Fuller, proposing a "new model army", gave no less than seventeen ways in which such a mechanized force could effect economies. Tanks saved men and weapons, organization and maintenance were simplified, tanks saved fighting manpower, infantry casualties (and enemy casualties would be correspondingly increased), artillery and cavalry personnel, ammunition, manufacturing manpower, transport, weight carried by infantry, labour on the battlefield, property, forage and food, time and cost in production. This was a very complete list and summed up the ways in which tanks, by their increased efficiency, could reduce effort.(5) He returned to the subject in 1921 and gave a similiar list. From this he concluded that mechanization offered Britain

considerable benefits: the war had increased the territory that her forces had to police but AFVs could, by virtue of their greater speed, patrol more territory than a slower conventional force. Thus, the Army could be reduced in manpower and money without reducing its capabilities if it were mechanized at the same time as it was reduced.(6)

These were good arguments and they were convincing arguments. They were supported by war time experience. In the great tank battles, a few thousand men in tanks were able to do what hundreds of thousand of infantry men were not able to do; and the tanks could do it in less time.(7) Indeed, these articles and arguments summarized above were hardly even necessary - almost everyone accepted that tanks and mechanization held out the promise of more force for less money. Fuller assumed in 1922 without argument that tanks kept "men, movement and weapons alive".(8) Martel stated the axiomatic belief in the connection between tanks and economy more bluntly in 1927:

> The object of mechanization is to render an army more efficient in the performance of its duties without increasing the cost to the country.(9)

In 1928 General Burnett-Stuart turned the axicm around when he stated that money for mechanization could be found by a reduction in the number of horses and their riders in the Army.(10)

The axiom was prevalent in Parliament as well as in the Army. In 1924 two Members argued that tanks saved lives in battle.(11) The following year, Stephen Walsh (12) supported the economy axiom by saying that if the Army was to be small, it must be made efficient.(13) Again in 1925 a Member stated that

> Mechanicalization ought to be encouraged, because it means <a saving of> manpower at the expense of firepower.(14)

In 1929 a critic of the Army Estimates argued that too much was being spent on the Army and that there were too many soldiers in a day in which, with more modern equipment, a smaller army would be just as effective.(15) In the same year it was argued that, thanks to mechanization, fighting strength had greatly increased, so that, despite reductions in expenditure, the British Army was still very powerful.(16) There are many more examples of the tank/economy axiom which could be given but these are sufficient to show that many from soldiers to pacifists agreed that mechanization gave increased efficiency for decreased spending.

The axiom was officially assumed to be the case: indeed the Secretaries of State for War used the increase in mechanization as a defence against the charge that they were allowing the Army to become too weak.(17) In 1921 Worthington-Evans gave a clear statement which was to be accepted by his successors:

> The ultimate practical use of tanks and

armoured cars and their relation to the other arms of the service has not yet been finally settled. The general view is that mechanical means of fighting must be developed to the fullest extent. The cost of maintenance in peacetime is less and the economy of manpower in actual war is likely to be greater.(18)

The Geddes Report had accepted the axiom and it was repeated to the House of Commons by the War Secretary (19) in 1922.(20) In 1923, in answer to charges that the Army was much weaker than it had been in 1914, Lord Derby stated that the increase in mechanization had made the reduction in numbers no matter for concern.(21) In 1930 a similiar charge was made and a statement on policy was asked for. The answer was short and to the point:

> The principal object of mechanization is the efficiency of the Army.(22)

As the foregoing makes clear, there was wide agreement on the connection between tanks and economy through their increased efficiency, so much so that the matter was never much debated or discussed.(23)

There were some who, against this widespread agreement, raised unpleasant questions. Tanks could save lives; so they had done during the war and so, it was assumed, they would do ever after. But in 1925 Lieutenant Colonel F.A. Pile predicted that a future war would open

with quite bloody tank battles in which it was possible that the opposing armies would completely exhaust their tank forces in a fairly short time.(24) In saying this Pile, an RTC officer himself, may have been guided by the high tank casualties in the war. At any rate, his warning appears to have been ignored.(25) Undoubtedly the most persistent critic of the exaggerated claims of the tank enthusiasts was Victor Wallace Germaines. He was not convinced that tanks would lead to economy. He bolstered his arguments (and, at the same time, somewhat weakened them) by deductions drawn from naval history. The battle of Trafalgar had seen 31 ships and 18,500 men in Nelson's fleet and his fleet had suffered 9% casualties. Between Trafalgar and Jutland there had been an incalculable progress in naval mechanization. If the mechanization/economy relationship was as the tank enthusiasts claimed, one could expect Jellicoe to have had less men and ships than Nelson and many less casualties. In fact the Grand Fleet at Jutland had had 147 ships (any one of which could have easily sunk Nelson's entire fleet) and no less than 56,883 men; the casualties at the later battle were higher both relatively and absolutely - the fleet lost 11% of its crews. Germains insisted that "tanks and aircraft substitute nothing".(26)

In fact, the Second World War was to show many examples of tank attrition battles (27) and it seems that Pile and Germains were more correct in their reading of the future than the majority. Nevertheless, whether or

not the assumption was correct, it was almost universally accepted throughout the inter war tank controversy: tanks, because of their greater efficiency, would effect economies in lives, manpower, effort, money and time. Tanks, in short, were the arm of the future.

Machines were the future. One of the points that Fuller never tired of making was that mechanization would be continuing the evolution from "muscle power" to "machine power" that had already occured in civilian affairs.(28) To him tools were essential and they won wars:

> ...the outstanding lesson of the 4000 years of the known history of war <is> that 'war is a matter of tools, and that the highest mechanical weapon nearly always wins'".(29)

At another time he stated flatly that tools always won; the incompetent general with the up to date weapon could not fail to defeat the less well equipped military genius.(30) This notion of the evolution from muscle to machine was echoed in other circles. Milne agreed that Foch's opinion that future wars would be determined by factories and mechanical resources was shared by "every thinking soldier".(31) General Kirke, in the Report of the Committee on the Lessons of the Great War, agreed in this very Fullerian passage:

> A modern army has become like a muscle-bound boxer...The only alternative appears

> to be a greater reliance on AFVs...They alone at the present time appear to be capable of restoring that power to deliver a quick and powerful blow, which was lost by the armies of yesteryear.(32)

Milne agreed with this ability of the tank to "revive the possibility of the art of generalship"; the world could not survive another war with the bloodshed of the Western Front: tanks and their mobility could ensure against stalemate.(33)

This is of course the reason for the widespread belief in the connection between tanks and economy that was so prevalent during the period - tanks were simply so much more effective than anything else. Tanks were more mobile than anything else (34) and it was the combination of mobility with hitting power and protection that made them so effective. Indeed the tank was incorrectly described as being "unique" because it combined these three elements.(35) It was frequently stressed how helpless the other arms, and the infantry in particular, would be when faced with tanks (36) and it was noticed that the presence or threat of tanks "not infrequently sufficed to cause arthritis in the opposing command".(37)

Fuller prefaced his famous "Plan 1919" with a statement that the tank had changed the art of war (38) and this was echoed by a CID sub committee in 1928.(39) Warfare after the tank would never be the same. Brigadier

Spears spoke for many when he said in Parliament that the lesscn of the war had been that infantry could not attack machine guns without tank support.(40) This was supported by the findinqs of the Committee on the Lessons of the Great War:

> If the use of heavy guns and tanks is denied to us...we shall be severely handicapped.(41)

It seems that we should not be wrong in expanding our resources in tanks to clear the way for the infantry.(42)

Should we again have to intervene on the Continent, we must be prepared for mobile warfare supported by every possible mechanical or scientific contrivance.(43)

Mechanization was inevitable as a report on the reduction of cavalry units in 1921 admitted when it spoke of

> The necessity fcr fostering those methods of mechanical warfare, the utility of which was demonstrated by the late war.(44)

Mechanization was coming and nothing could keep it back: Milne told the Secretary of State for War in 1927 that "Ultimately cavalry must give way to a mechanized arm...".(45) The conclusion from the war was that the movement of unarmoured men on the battlefield was impossible and that only artillery and AFVs could solve the problem.(46)

It was not just in so called progressive circles that the inevitability and desirability of mechanization was felt: cavalry men knew it too. The Cavalry Committee agreed in 1926:

> ...that, while it would eventually be possible to replace mounted men, to some extent at any rate, by men carried in some form of armoured car, there can be no question of doing this until a cross country armoured car has been produced and proved, by thorough trial, to meet all requirements.(47)

Grudging agreement no doubt, but agreement none the less. Not grudging was an editorial in the Cavalry Journal by the Editor, Major General T.T. Pitman, on the subject of the mechanization of the 11th Hussars and the 12th Lancers. He condoled with them for the loss of their horses but stressed that the future of cavalry depended upon its being made hard hitting and that that meant that they must adopt AFVs.(48) Pitman was the Colonel of the 11th Hussars.

There can be no question whatever that mechanization was supported in the highest levels of the Army and the governments and by a wide cross section of other soldiers. Tanks were too effective and too useful to ignore. And that is why the Tank Corps had been established in the first place; the delay was caused not by searching discussion of whether or not the Army should have tanks -

that was not in question - but by uncertainties over the future strength of the Army and problems with tank production.

Sufficient evidence of a broad spectrum of agreement that the Army should equip itself with tanks has now been demonstrated. Were there any who thought that the tank had no future? So much has been written about the opposition that the Tank Corps suffered that there must have been a lot cf people who dismissed the tank completely. This is not the case. Research has turned up only three people who thought that there was no use for the tank. Sir Charles Townshend gave it as his opinion in the House of Commons on 15 March 1921 that tanks were no use: the Germans had strewn land mines in the war and stopped them and he told the House "do not rely on your tanks in Germany today".(49) Thomas Henderson in 1924 saw no future for them nor for the Army either: in the next war "whole tracts of the country...will be destroyed by poison gas" dropped from aircraft.(50) Major General Sir Louis Jackson stated in 1919 that the tank was already obsolete.(51) But, even these apparently definite opinions were not so against the tanks as would seem at first glance. Townshend thought that tanks might have some future for crowd control or in open spaces. Jackson, having made that statement, went on to talk about the utility of mechanical transport and armoured cars in battle and ccncluded his speech by describing a future battle in which armoured cars and motor cycles assisted by

aircraft and motorized infantry would strike a hundred miles into the enemy's rear.

The foregoing is not to be understood as an assertion that everyone was a tank enthusiast. There were many who doubted the future of the tank. Given that the British Army was to utilize tanks, there were many problems left to solve. How vulnerable were they? Could they successfully operate independently? Were they sufficiently mobile to act as the Army's sole mobile arm? These questions were not matters of faith to be settled by quasi theological arguments about future masses of non existent fast tanks cutting through thousands of helpless infantry. They were issues that had to be settled by experimentation with actual vehicles. These will be dealt with later, but we shall now turn our attention to considering the lingering doubts that remained about tanks given the acceptance that they had an important future.

The tank theorists were prone to making exaggerated and unrealistic claims for their machine. There are strong parallels between the claims of the RAF bomber theorists and the extreme claims of the tank men. In neither case could the claims be supported by the performance of the machinery. This parallel has received scant attention and the reason is not hard to find. The great bomber and airpower myth has been adequately exploded by events; the tank myth has proved more durable. In fact, the Second World War was dominated on land by

armoured vehicles as the tank enthusiasts had claimed. But the tanks of that war were not the tanks of the inter war period and this is particularily true of British Tanks. British tanks were found to be quite inadequate for their tasks and remained, until the very end of the war, at least a generation behind Soviet and German tanks and perhaps half a generation behind American tanks. In fact, as subsequent pages will show, the tanks of the Royal Tank Corps between 1919 and 1933 could not do what was claimed for them. Tank claims could not be supported by trials.

From the earliest beginnings of the tanks in British use, grandiose claims were made on their behalf by their partisans. Lieutenant Colonel Giffard Martel, an Engineer, in 1916 or 1917 made the first statement of what was to become a cornerstcne of RTC faith:

> Unless this war ends in a disarmament and a temporary universal peace, there can be little doubt that the present unarmoured and unprotected Soldier will cease to exist and a tank army take his place.

For the future he saw tank bases dotted around the world defended by trenches, land mines and "pillars" (presumably concrete tank cbstacles) from which tank armies would sally forth to do battle with each other.(52) Depending on one's bias this may be hailed as brilliant prediction (which has yet to come true) or dismissed as outright fantasy. Tanks would in the future take over everything -

that was a cardinal axiom of the leading tank theorists. In 1921 Fuller was "certain that the infantryman's future place is in a tank".(53) He was also quite certain that the tank had won the war and that future wars would begin and end with a "knockout blow" delivered by the tanks.(54) Captain Basil Liddell Hart, the third of the leading theorists and publicists of the tank, was equally convinced that in future the tank would replace every other arm in land warfare:

> Military operations in the future, the exact date being still indefinite, will be carried out almost exclusively by fleets of tanks and aircraft which will be maintained by communications based on caterpillar tractors, with the aeroplane transport as an auxilliary or secondary line of supply.(55)

By 1926 Liddell Hart had slightly modified his earlier opinions to the extent of adding "tank marines" to the "'land fleet' of battleships".(56) As late as 1927, despite growing signs to the contrary, Martel was still convinced that an army of light tanks and Vickers Mediums could do anything.(57)

Especially marked down for takeover by the tanks was the cavalry. In 1919, it was stated that the Medium D could replace cavalry entirely and, it was evidently thought by the author, it could replace them immediately.(58) Fuller reiterated this in 1922.(59)

Unfortunately, the Medium D turned out to be an expensive failure thanks to its extreme mechanical unreliability. But Fuller was equal to the change: in 1925 he was saying that the Vickers Medium could replace the cavalry.(60) It was alright to say this in 1925, but in later years it was too evident that the Vickers Medium could not race cavalry across ground without any hope of being able to go even half as fast. But the belief lingered and the line usually adopted was, to quote Liddell Hart:

> The tank assault of tomorrow is but the long awaited rebirth of the cavalry charge... 'The cavalry is dead! Long live the cavalry!'.(61)

The relationship of the cavalry and the tanks in the controversy will be treated in greater detail in Chapter 7.

The tank men were correct in this at least - the tank has replaced the cavalry completely; but they were wrong on the other grandiose claim that the tanks would replace everything else as well. Military history has yet to show an example of "tank fleets" and, as the 1973 Middle East War demonstrated very clearly, there is still a place for the infantry man on the battlefield. But the belief that, eventually, all soldiers would be in tanks was a cornerstone of the RTC until well into the next war when heavy casualties and hard won experience convinced them that an armoured formation without infantry was too vulnerable to exist.(62)

Another curious belief of many in the RTC was that Britain would gain more benefit from mechanization than any other nation. The argument went basically as follows. Britain has a professional, long service army and any major enemy which she is likely to meet will have a short service conscript army. It is very difficult to learn how to use a tank and it takes a lot of time. Only British soldiers, because of their longer service with the colours, have that time. Therefore, Britain's tank forces will always be better skilled than her enemy's. This was nonsense as the German panzertruppen were to show, but it was long believed.

Martel came out with this notion in 1929. After describing a formation for a mechanized army, he admitted that his article assumed British superiority in this area.

> This is reasonable enough, as there is little chance of our meeting such opponents <i.e. with other armoured forces> in our small wars, and any conscript army that we might meet in a great war is very handicapped compared with ourselves in the production of armoured formations. Whereas we can create very large savings by comparatively small reductions in strength, because our pay bill is a large one...(63)

This was too optimistic: in the first place, it was not clear at all just how the British Army could have made its

"small reductions" considering the fact that it was over stretched already; and, in the second place, suppose the other country just spent more money? In 1929 he was still certain of British superiority in mechanization:

> In any case we are already far ahead and will be far better equipped mechanically than anyone else if we went to war in the near future. (64)

He was taken to task for these lighthearted statements by Major J.C. Tilley, one of the few propagandists for tanks whose articles demcnstrated a real knowledge of tank capabilities. (65) Martel defended himself: there were no small powers with tanks and there was no sign that any large power was switching from a large conscript army to a small mechanized one. (66) He failed to consider the possibility of a major power developing a large conscript mechanized army or even a large conscript unmechanized army with just enough mechanization to make all the difference. In fact, civilians can learn to use tanks in a surprisingly short time; they are not as difficult as all that. Perhaps the reason why these thinkers thought that tanks were so hard to learn was that the difficult Vickers Medium demanded an extremely high standard of mechanical and driving skill to get it on the road and keep it there.

There were other dogmas of the Tank Corps which were neither accurate nor supported by the facts and were to be abandoned with war experience - the over emphasis on

mobility, the dominance of the light tank, the emphasis on machine guns as tank armament and the lack of careful thinking about future tank/tank battles. These will be considered later. But the two convictions given above - that tanks would replace the other arms, and that Britain would keep her supposed lead indefinitely - were basic convictions which permeated the RTC's thinking. When, in the next chapter, the actual capacities of the tanks of the period are described, we shall see how ridiculous they were. There is a strong parallel - neither Bomber Command nor the Royal Tank Corps could demonstrate their doctrines in practice on the outbreak of war.

As has been shown, it was generally accepted in the early days of the Tank Corps that mechanization and saving money were connected. There was, of course, one rather obvious flaw in this notion. While in the long run, tanks might save money, in the short run they certainly didn't. For example, the 1928/29 Estimates give the cost of a tank battalion as 185,200 Pounds for 535 all ranks; by contrast a line infantry battalion with 791 all ranks and 21 animals cost 109,800 Pounds and a line cavalry regiment with 479 men and 277 animals cost 86,400 Pounds. Now, of course, this comparison is unfair, because a tank battalion was considerably more powerful than either of the other two units. But that was just the problem: mechanization had been continually defended in Parliament and other forums of discussion as being a step towards reduction of the Estimates. This was true enough -

mechanization did provide "more bang for the buck" - but only in the long run and, even then, only if there were large scale replacements of the other arms by tanks and other AFVs. But, as was shown in the previous chapter, as it was, the British Army had too little and was expected to do too much. Members of the House of Commons, having heard for so long about how mechanization would save money, were naturally a little restive after six or seven years of "mechanization" with no savings to show for it. And, to make matters worse, the Secretaries of State for War did not make clear to their listeners the unreasonableness of expecting instant savings especially on the small provision of vehicles that there was.

Accordingly, there was a certain amount of criticism of the cost of the new arm. In a thoughtful speech in 1926, Captain H.P. Holt, who had had the unusual experience of having served both in the cavalry and in the tanks in the war, attempted to walk the middle line in the cavalry/tank debate that periodically came up but concluded by reminding his audience that a tank battalion cost more than twice as much as a cavalry regiment.(67) Brigadier H. Clifton Brown, upon discovering that a mechanized cavalry regiment cost 5% to 10% more than it had when it had had horses, reminded Duff Cooper that one of the reasons that mechanization had been introduced was that it was supposed to be cheaper.(68) In 1932 he suggested that the regiment be re horsed in order to save money.(69)

The trouble was that mechanization was too expensive in the short run to save money in the long run. Worthington-Evans as much as admitted this when he said that the mechanization of the Army's transport would have to await a machine with commercial possibilities because the Army could not afford to develop such a truck alone.(70) In 1929, in a statement by Worthington-Evans, is discovered a revealing example of mechanization in practice as distinguished from mechanization as described in official statements. Lord Apsley had asked about armoured cars for Territorial units of the Tank Corps. He was told that there was no money actually to supply these vehicles to the units; instead, each Territorial unit had been provided with two six wheeled trucks which they would have to pretend were armcured cars.(71) There just wasn't enough money to do the job properly - in 1936 the British garrisons in Egypt were strengthened: this reinforcement stripped the Tank Corps in England of every single one of its light tanks and most of its radio sets!(72) In these circumstances it was patently impossible ever to mechanize sufficiently to start enjoying the savings.

It must therefore be concluded that, in practice, there was something unreal in all the claims for economy's arriving in the train of the tank. It was a very theoretical suggestion and it was never made clear to those who were expected to accept the claim that the promised economies were dependent upon one vital assumption: there would have to be enough tanks and other

vehicles in stock before any reliance could be placed on their capacity to release other units. Unfortunately, this caveat was never mentioned when people were assured of the savings sure to result from mechanization. The apparent disparity between facts and promises fed the growing conviction that the tank enthusiasts were claiming more than they could prove. It was a foolish promise to make: the reason for getting tanks had nothing to do with saving money - any modern army that wanted to stay in business had to have them. That was the only acceptable reason.

Another growing doubt that had far reaching results was the reliability of the tanks. We have already seen that tank breakdowns in the war were very high and, a study of later armoured actions shows that this "lesson of the war" was correct and mechanical casualties were and are a feature of tank battlefields. The breakdown issue was completely ignored by the tank propagandists who, in their fantasies of future tank armies, could not, apparently, be bothered with such trifles. (73)

But the reliability question was not a trifle and others did not ignore it. When Montgomery-Massingberd (74) was GOC of the 1st Division he wrote a memorandum on mechanization. He began

> I am strongly in favour of a greater use of mechanicalized vehicles in the Army both for fighting and for administrative

purposes...

But there were problems. He was sceptical of the tank's ability to make long range movements across country. He doubted whether the crews could endure a 100 mile cross country trip and, in any event, he doubted whether tanks would ever be fast enough. He did not believe that

> any vehicle will or can be designed capable of mcving cross-country in Europe at more than an average of 6 to 8 miles an hour.

He continued, tanks (that is, the Vickers Nedium) could travel at 20mph on roads (that was, actually, a rather doubtful propcsition) but they certainly could not make such speeds overland. In conclusion, he believed that the British tanks, although a great improvement over those of 1918, were "not satisfactory. They break down easily, are vulnerable and their pace across country is slow". Nevertheless, despite his undeserved reputation for being an opponent of mechanization, he was in favour of mechanizing a division and experimenting with it in the near future. (75)

This breakdown matter was not confined to tanks. In 1929 the House learned that the armoured car squadrons in Palestine were plagued with punctures. (76) In 1932, replying to a gibe that the Household Cavalry ought to be paid for by the Greater London Council because all it was good for was attracting tourists, Brigadier E. Makins said that the speaker

certainly has not studied the manoeuvres of twc years ago when the cavalry absolutely walked around all the mechanical contrivances of modern times. Practically all the mechanical vehicles broke down and the cavalry walked around the lot.(77)

No doubt these comments can be dismissed as yet another example of the "chorus of dissent that arose from soldiers whose minds did not readily accept the latent power of mechanized forces".(78) But, before they are thus condemned to ignominy, two events should be considered. In August 1925 six tanks (Vickers Mediums) went for a 231 mile round trip. For most of the journey they travelled on roads. Three sets of tracks were broken and one of them was completely destroyed; one tank suffered major qear trouble and another burnt out its engine.(79) There was an even more ludicrous example in January of that year. Two Vickers Mediums were sent to India in order to see how well they did out there. These were not standard issue vehicles for British use; they had been "Indianized" with the addition of internal cooling fans and some insulation against the heat (and January is not India's hottest month). The two tanks were sent by train to their barracks and then were moved off the train and began, under their own power, to move to the nearby base. On this short trip, despite the care that they had received on their voyage from their attendent mechanics, one of

them caught fire!(80) The reader is again reminded that these were special tests under favourable conditions and is invited to speculate on what would have happened if the first journey had been made across country or the second in the hottest months. Perhaps Makins was not exaggerating and perhaps Montgomery-Massingberd was simply stating the facts. In any event, the unreliability of the Vickers Medium design was to long raise doubts about the tank's future and was one of the principal reasons why the cavalry was retained; the cavalry may not have had much in the way of firepower or protection, but at least it was reliable and reasonably mobile.

The doubts remained even though most people were prepared to give the tank a tryout, and, as time went on, the doubts became strcnger. This explains the peculiar fact that there was a decrease in confidence in the future of the tank in the 1930's - it was not a "plot", nor was it the resistance of reactionaries - these doubts were sincere and reasonable. The gradual erosion of the belief that tanks and economy were inseparably linked has been described above and it has been suggested that the tanks themselves were perhaps not reliable enough to act as the spearhead of future armies. These were not important worries: the Army was committed to mechanization for other reasons than saving money and mechanical reliability could be (and was being) improved.

There was, however, one very serious doubt about the validity of the future sketched by the tank propagandists. How vulnerable would tanks prove to be when confronted with determined infantry equipped with small, mobile rapidly firing guns? The military journals give evidence of a considerable degree cf controversy on this matter and they show a clear and interesting pattern. Until the late 1920's it was believed that only another tank could stop a tank; after that time, it becomes evident that tanks will prove to be a great deal more vulnerable than had previously been thought. The increasing evidence for the weakness and helplessness of tanks when faced with anti-tank fire had two very important results that, in previous descriptions of the tank controversy, have been either ignored or slighted as "prejudice". The first result was that many came to doubt the promise that the tank had seemed to show. This will be discussed in what follows and it will be shown that there were very good reasons for believing that the British tanks would find themselves seriously at risk to modern anti-tank weaponry. The second result was the abandonment of the Tank Corps of confidence in the medium tank and an increasing reliance on light tanks. This will be dealt with in the following chapter.

In 1922 appeared the first of a long series of articles in the military journals concerned with the problem of anti-tank defence. Cavalry and infantry were at the present "helpless" against a tank attack and the

only hope which the author, an artillery man, could see was that they be protected by a gun, mounted on an armoured chassis. In short, his suggestion was that tanks (or, in the later German term, jagdpanzern - "hunting tanks") must defend the other arms against tanks.(81) In 1922 another artillery man suggested the same thing.(82) Another article in 1923, after considering and dismissing the 18 pounder and the 3.7 inch howitzer as too slow or too vulnerable to machine gun fire from tanks, decided that a small AFV armed with a .5 inch armour piercing machine gun offered the best solution to defence against tanks.(83) Others concentrated on passive defence such as anti-tank mines or obstacles.(84) Another writer analysed war time experience and argued that neither direct nor indirect fire had had success in stopping tank attacks and concluded that the only chance of defence lay in a combination of passive obstacles and the construction of a small tank destroyer.(85) The belief that the best anti-tank weapon was another tank was defended in 1924. Guns were not very effective because they were not in sufficient supply and because a tank was a difficult target to hit; mines presented problems because of their bulk and the time required to emplace them, and then they were equally dangerous to friend or foe; aircraft could not bomb tanks accurately. Only another tank could meet a tank on equal terms.(86) An artillery man, after dismissing the present anti-tank guns (the role had been tentatively assigned to the 18 pounder or to the 3.7 inch

howitzer) suggested a 6 pounder gun on a tank chassis - another jagdpanzer.(87) A French article, repeated in the Journal of the Royal Artillery, could suggest nothing better than that people should wait until something turned up.(88) In 1925 it was suggested that the 18 pounder was the best gun that the Army had but that, in order to overcome its immobility in the anti-tank role, it should, once again, be mounted on a chassis.(89) In 1926 the jagdpanzer was suggested again as the only possible anti-tank weapon.(90) Another writer, from the Royal Engineers, could only say that tanks presented a very serious problem for the defence and all that could be done (given that there would never be enough anti-tank guns) was to rely on natural and artificial obstacles.(91) A Tank Corps officer was confident, relying on war time experience, that guns could not stop a tank attack although they could sometimes destroy a large number if the tanks were improperly handled.(92) Once again, in 1927, it was said that only a tank could hope to stop another tank.(93) In 1929 an article confidently asserted that the machine guns which were in plentiful supply on Vickers Mediums could, in every case, so disorganize and frighten a gun crew that the tanks had little to fear from anti-tank gunnery.(94)

This large number of articles from all branches of the Army forces the ccnclusion that, until the late 1920's, the Tank Corps had every confidence that it could dominate any future battlefield. There was almost nothing that the other arms could do to stop them. Guns were in

too short supply and, even if there were enough of them, they wouldn't be able to hit the target. Passive defence measures (tank traps, natural obstacles, mines etc) were a weak reed on which to lean: the natural obstacles would not always be present, and the artificial ones would take time to construct and the time might not be available. Aircraft were too inaccurate with their bombing and tanks were not always easy to see from the air. There was, therefore, nothing left except another tank or a tank destroyer.

The reason for this confidence in the minds of drivers of tanks with slow speeds and weak armour was very misplaced. The tank men were so confident and the other arms so despondent simply because there were no anti-tank guns at the time. Evidently the German developments in this field late in the war had been forgotten.

Most of the people writing about anti-tank defence before the late 1920's concluded that the tank was the only acceptable defence, but there were others who were prepared to speculate that a light gun might provide a solution. In 1924 an infantry man believed that if a portable weapon could be produced which was capable of penetrating armour at short ranges, then "the infantry would have nothing to fear from tanks".(95) An article in 1924 was reasonably confident that, if a light gun could be built, it could have some success against tanks: as the gun would be sited in bad country, the tanks would

therefore be travelling more slowly; a gun, hidden behind bushes, would have a good chance of hitting the tank. The author recommended the Beardmore gun as ideal for the purpose.(96) In 1925 a writer was prepared cautiously to approve the 18 pounder and suggested a .5 inch Browning machine gun as an infantry anti-tank weapon.(97)

By 1926 or 1927 the proponents of the gun were more confident and it was suggested that a 3 pounder automatic gun was the best anti-tank weapon. This writer was prepared to go so far as to state boldly that the gun should <u>not</u> be in an AFV - he felt that the armoured housing would slow down reloading, limit the gun's traverse and would create too large a target.(98) Another article, written in response to the last, poured scorn on the 3 pounder (which, it was said, would jam too often) and suggested a small dual purpose gun with two different barrels.(99) Opinion was changing overseas as well: an article by a US officer recommended the small gun for the infantry's prctection.(100) The small anti-tank gun was gaining favour. A conference of the 2nd Division in 1927 set out the characteristics of an infantry anti-tank gun stressing that it must be handy.(101) In 1930 it was officially assumed, for the purposes of a new infantry organization, that the following should be considered to be the infantry anti-tank weapon: .8 inch calibre, 5 rounds per second rate of fire with an option for single shot, the projectile to penetrate 16mm of armour at 800 yards.(102)

The invulnerability of the tank had been something of a confidence trick: like so many of the tank enthusiasts' articles of faith, it was unfounded. It depended upon the absence of an anti-tank gun and, when people turned to the question of anti-tank guns for the future, their task was made easier by the inadequate armour of the tanks. As soon as the lightness of the armour was appreciated, it was realized that all that was needed for infantry defence was a heavy machine gun. So light was tank armour that it was not even considered worthwhile for the 18 pounder to carry armour piercing ammunition:

> the present ammunition of the 18 pounder is master of any type of AFV likely to be met with in quantity at present. If future developments render the direct perforation of <u>much thicker</u> armour essential, we have available for production, either an armour piercing shell (the design for which exists) or hard steel plugs for use on the existing shrapnel shell. The latter can be prcduced at quite short notice. (My italics)

It was not considered necessary to produce the steel plugs until October 1935.(103) The 18 pounder HE shell with fuze 101e was effective against 1 inch (25.4mm) armour up to 2000 yards if the angle of impact was less than 20 degrees. The heaviest armour to be found on any British

tank of the time was the 28mm on the Independent (of which only one was built); the Vickers Medium's heaviest armour was 8mm. The anti-tank rifle which had been hurriedly produced by the Germans in the war had been capable of penetrating 12.7mm of armour at 400 yards. Given the armour piercing capacities of these two rather primitive anti-tank guns and knowing of the 13mm armour piercing machine gun which the Germans were developing when the war ended, it is difficult to explain how it was that so many people were taken in by the legend of the tank's invulnerability.

The legend began to fade as engineers and gun designers turned their attention to light anti-tank guns. In 1924 a gun weighing 82 pounds was developed; the Beardmore gun fired a 2 pound shot at 1550 feet per second which could pierce 1.18 inches (27.97mm) at 328 yards.(104) In 1925 another small gun was produced in the USA.(105) The Oerlikon 20mm machine gun, described in the Royal Tank Corps Journal of 1926, fired 100 rounds a minute at a muzzle velocity of 2,130 feet per second. It could penetrate 25mm cf armour at 200 metres and 15mm at 600 metres.(106) In 1927 seven heavy machine guns were described, all of them could have fired a rapid stream of bullets which could penetrate any British tank at at least 500 metres range.(107) In 1928 another four were described. The heaviest, the 47mm Bofors, firing 30 rounds per minute, could pierce 20mm of armour at 3400 metres and had a 45mm (sic) thick armour shield to protect

the gun crew from tank fire.(108) A table published in Britain in 1928 indicated that the thickest armour on British tanks could be holed at 2000 metres by every type of anti-tank gun in existence.(109) A new scheme, aired in the Royal Tank Corps Journal of 1929, informed its readers of two dual purpose infantry guns. The Skoda version had a 70mm barrel into which could be inserted a 32mm barrel so as to be effective with either HE or AP ammunition. The Hollandsche weapon had two interchangeable barrels, one of 75mm the other 47mm; in its armour piercing configuration it could penetrate 22mm at 3200 yards.(110) In 1932 the Halger Ultra bullet of .28 inch calibre was developed. With a muzzle velocity of 5000 feet per second, it could hole 12mm of armour with ease at 60 yards range; at a range of 50 to 125 metres it was able to penetrate 5/8ths of an inch of 1 1/2 inch armour knocking off great scabs on the inside, several more bullets fired at the same spot were able to penetrate.(111) This was nothing more than a rather small rifle bullet fired at a very high velocity. As can be seen, once attention was turned to the problem of constructing heavy armour piercing machine guns or light anti-tank guns, gun performances were achieved in a very short time which were greatly superior to existing armour. These were not achieved by heavy immobile guns but by, in most cases, very small and easily concealed rapid fire weapons. It should come as no surprise that, once over their initial pessimism, the infantry began to think that in a tank

attack they would be able to beat the tanks back.

Accordingly, as the articles lamenting the helplessness of infantry began to disappear from the journals, they were replaced by articles in which reliable anti-tank defence was confidently assumed. Reference has been made to the occasional article before 1927 in which the other arms were advised to keep their hopes up for an effective anti-tank gun, but these were only declarations of faith. The real attack on the vulnerability of tanks began in 1927 with the publication of a book by that indefatigable critic, V.W. Germains. He stated his conviction that tanks could not win against the gun: no matter how fast a tank was, a bullet was faster; guns were cheaper and so more could be built; guns were a much smaller target than tanks were and, in any case, fire from a moving tank could never be as accurate as that from a stationary gun.(112) In 1928 he pointed out that a tank needed all round armour and it could not counter gun development in increasing its armour in one place as could a battleship. He did not think that the tank could increase its armour sufficiently to be able to counter the gun for it was an easy matter for the gun to increase its armour piercing capability by increasing the length of its barrel. Tanks faced annihilation if they were to charge anti-tank guns.(113) In 1930 he returned to the attack: the gun armour "race" was over and the gun had won.(114) In 1929 an infantry officer echoed the new found confidence that an infantry force with the new weapons

could hold up a tank attack (115) and another reiterated this in 1930.(116) An Engineer warned that in a future war, given enough anti-tank guns in the defenders' hands, an attacker could lose a tank force in an afternoon.(117) In 1931 a writer attempted to moderate the extreme claims of both sides in the gun/tank debate but nevertheless pointed out that overrun guns often can be remanned but that knocked out tanks are useless.(118)

Neither extreme claim was right: tanks have not been able to operate on battlefields free from interference from anything except cther tanks but neither has the infantry been able to smash tank attacks with ease. The truth is in the middle. Tanks have tended to dominate land warfare from 1939 onwards but they have always had to be mindful of anti-tank weapons. Guns like the famous "88" have destroyed many tanks especially when the tanks have charged straight at them; the lone infantry man with his bazooka or panzerfaust (and today his TOW or SAGGER) has always had a chance of destroying a tank given the opportunity.

But it does not, in this context, matter greatly what happened in later battle experience. What matters in this discussion of the tank controversy between the wars is that until about 1928 it seems to have been generally accepted by military thinkers in Britain that there was no adequate defence against a tank except another tank and that from about 1928 it became generally accepted that

there were guns which could, at the very least, force the tanks to pay a heavy price for their successes. The debate about the vulnerability of the tank continued (and, for that matter, continues today because of the successes of ATGWs in the 1973 Middle East war) until experience in battle impressed a more reasonable and pragmatic approach to the problem. It is sufficient to say that by the early 1930's, for right reasons or for wrong, it was the tank men who were feeling vulnerable and not the infantry.

The tank was accepted by the Army without debate - it was obviously to be of some use. But, once accepted, lingering doubts remained. The expense involved in mechanization, the unreliability of the Vickers Medium and, above all, the anti-tank question, had, by 1930, sapped much of the early confidence in the future of the tank. Something must be done about these problems and it was left to the tank designers to attempt to find the solution.

CHAPTER FOUR

British Tank Design

All tank designs are compromises. The tank is a combination of hitting power, protection and mobility but these three factors are not compatible. A tank with the thickest armour that could be made would have perfect security, but it would be so heavy that it could not move. Likewise, a tank whose designers concentrated on the highest possible speed would be able to carry neither armour nor weapons. A tank with the largest possible gun would be too large for security owing to the turret ring diameter necessary to cope with the recoil of such a gun. Therefore, tank designers must continually balance the requirements of hitting power, protection and speed with one another. It is not possible to build the "perfect tank" which would be proof against all anti-tank fire, lavishly armed and very fast. Tank designers must decide, before they start their drawings, what the balance of the three factors must be, otherwise the gun designers will be at cross purposes with the armour designers and both of them with the engine designers. Normally these decisions should be made as part of the first steps of a design and they should be made in consultation with the potential users of the vehicle. In Britain, in the period under consideration, this normally was not done. Ironically,

the two tanks in this period which were the product of consultation with the users were not put into production. The Vickers Medium was designed by the Vickers company. The Tank Corps was not consulted on the design. The other major design development between 1919 and 1933, the light tank, was a private venture which was accepted for a variety of reasons of which not the least was its cheapness. These two vital constituents of British tank design happened, therefore, almost by accident.

All the major armies of the world experimented with tanks between the wars and, except for the Germans, tended to follow either the French model of the tanks being restricted to an infantry-accompanying role or the British of tanks being reserved for exploitative roles in all tank formations. The Germans, on the other hand, seem to have begun their development with the idea that the tank, organized into all arms formations with infantry and artillery, was a fighting weapon and not merely a specialist weapon. The dramatic success of the German panzer divisions in 1939 and 1940 made the other armies reconsider their armoured organization and they all, in varying degrees, adopted the German ideas.

The French, who were a close second to the British in inventing the tank, treated their tanks in the war as "assault artillery" and continued along these lines after the war and their tanks were made an integral part of the infantry in the 1920's. French development was hampered

by the fact that a large number of the small, slow and old fashioned Renault FT tank was left in service after the end of the war and, with the exception of a small number of very heavy tanks, this model remained virtually the only one in service until the later 1930's. In 1932 experiments began with large mechanized forces and by 1934, the cavalry (in which arm the tanks had partly broken out of infantry subjugation) formed a cavalry motorized division. Just before the outbreak of war, the infantry had formed divisions of heavy tanks intended for a role as "battering rams". Crudely speaking, French inter war thinking was characterized by seeing tanks in the role of helping the infantry get through opposition.

American development, again crudely speaking, followed French lines in the 1920's. In 1920 tanks were put firmly under the control of the infantry and any further development of a more imaginative role had to come f om the cavalry. Following the British lead, the United States Army established a short lived mechanized force in 1928 and in 1930 created a rather longer lived force. This latter was eventually to form the basis of a mechanized cavalry brigade. In 1932 the hold of the infantry was broken and mechanized forces were assigned to cavalry control. The Americans designed many tanks which were much influenced by British developments and, as well, a number of Christie influenced designs. Basically speaking, then, United States development was infantry controlled until the mid 1930's when a more imaginative

approach was adopted. It was not until the German successes, however, that the US Army was able to completely break away from the domination by the older arms of the tank arm.

The Soviet Union managed to combine French and British ideas. Following the French pattern, tank battalions were assigned to the infantry divisions but, at the same time, independent mechanized brigades on the British pattern were also formed. Soviet design was heavily influenced by foreign initiatives and a number of models were cbtained from the British. A very large foreign influence was obtained from the designs of the American inventor J. Walter Christie some of which the Soviets purchased. From these prototypes were developed the BT tanks which were some of the best designs of the 1930's. The Soviets also designed some large multi turreted tanks. A characteristic of Soviet design and one generally absent in Britain, the United States and France was that of using relatively big guns on comparatively small tanks. By 1941 the USSR had by far the largest tank force in the world with more than 20,000 vehicles many of which were, however, obsolete. Soviet organization, which approached the German type, was not quite as balanced until battle experience convinced them of the wisdom of the German scheme.

Curiously, it was the Germans who, although last in the tank field, develcped the best armoured formations.

They had been slow to take to the tank in the First World War and, by the Armistice, had put into the field only some 20 tanks of their own design. The Versailles Treaty forbade tanks to the German Army but in the 1920's, attracted perhaps by this "forbidden fruit", experiments were carried out with dummy tanks and, indeed, several prototype tanks were constructed. German development and orqanization was unique in that all arms formations grouped around tank units were seen as true fighting formations capable of all military roles. The first panzer divisions were created in 1935 and by 1938 all armoured formations (the panzer divisions and the cavalry inspired light divisions) were taken under the same Inspectorate. Like the Red Army, the German Army, after a few false starts, believed in designing tanks with fairly large guns. After the German victories in the early years of the war, the other major powers were compelled to reorqanize their armoured units after the German pattern.(1)

British development will, of course, be treated in much qreater detail in what follows. Alone among the major tank powers in the 1920's, the RTC was established free from the control of other arms. It began in the 1920's with what was considered to be an "all-round" tank but, as time went on, came more and more to stress mobility over hitting power and protection. This policy reached its culmination with the British tank force of 1940 which was 85% light tanks. Mobility was considered

surer protection than armour. In what follows the development of this conviction shall be traced but, first, two important British assumptions will be noticed. These two assumptions were that tank battles are analogous to naval battles and that, rather than one all-purpose tank (what is termed the "main battle tank" today), there should be a variety of specialized tanks. The first resulted in some rather muddled thinking and the second in a large number of prototype tank designs.(2)

The naval analogy was mildly popular in British thinking and each of the leading propagandists - Liddell Hart, Fuller and Martel - was struck with it at one time or another. The reason for the existence of this analogy is no doubt because, in the early days of the tank, the thinkers had to create their theory from the beginning. The only model available for them to consider was that provided by the sole self propelled weapons system in existence at the time - the warship. Nevertheless, the analogy was not a complete one and there were vital differences between ships and tanks. Ships operate on what is, for most naval purposes, a flat and featureless surface and tanks do not. Ships cannot hide behind natural obstacles but tanks make much use of dips in the ground and other forms of natural cover. A great deal of naval tactics have to do with the facts of ship design. Ships are long and narrow and their armament tends to run along a centre line. They can, therefore, only bring all their guns to fire when they are lying broadside to their

target. Tanks, on the other hand, have one main gun in a turret mounted so that it can fire in any direction with equal facility. In shape they are short and wide. Consequently, tanks prefer to fire directly in front so that they present less of a target; ships prefer to present the larger target so that they may bring all their guns to bear. Furthermore, there is no particular limit to a ship's size but there is an upwards limit to a tank's size. Therefore, taking it all in all, there is only a slight analogy between ships and tanks and there is little to be gained from comparing the tactics of the one with the other.

Nevertheless, the naval model possessed certain attractions for some of the tank theorists. Martel's early paper on "A Tank Army" spoke of tank fleets operating from secure bases rather as the Grand Fleet operated from Scapa Flow.(3) During the war, Fuller had spoken of "striking analogies" between naval and tank warfare and went on:

> General staffs of both the Army and the Navy will have to institute a far closer liaison than heretofor if the full weight of the mechanical arms is to be developed and eventually applied to scientific warfare.(4)

An article in 1928 predicted the beginnings of a land fleet with a reconnaissance class (tankettes), cruiser class (Vickers Mediums), dreadnought class (Independents)

and a monitor class (Birch Guns).(5) Perhaps the high point of this analogy came when Liddell Hart, in a book written in 1959, could write of the exercises of 1930:

> ...the infantry division exposed itself to tactical disaster, and was only saved by the intervention of its attached tank battalion...Skilfully handled, this countered and partly crippled the enemy's tank attack, twice bringing off the naval manoeuvre of 'crossing the T'.(6)

Some of the defects of the analogy were admitted by him in 1936, when he compared tank and sea fighting but qualified the comparison by remarking on the opportunities for concealment possessed by tanks.(7) Such a qualification removes most of the value of the analogy. The naval analogy was not dangerous but its existence did reveal a certain amount of sloppy thinking in those who held to it.

More important was the belief that a specialist tank is required for a specialist job. This is another idea that must be considered erroneous by today's standards. Modern armies generally possess only one kind of tank which is intended to fulfill all battlefield tasks - the "main battle tank". Experience seems to show that there is no need for a host of different tanks, none of which may be where it is needed. The British, between the wars, were convinced of the need for different kinds of tanks. There were a number of articles in the military journals which allow us to descry a pattern. Until about 1924,

opinion seemed to be tending towards many kinds of tanks, but, after that year, it seems to have been generally agreed that three kinds - heavy, medium and light - would be adequate. As these articles are examined, however, it would be well to remember that, until 1927, there was only one kind in production and, after 1927, only two kinds.

This belief in the necessity for more than one kind of tank may be found from the earliest moments of the tank's history. A memorandum sent to the committee considering "landship" design in 1915, suggested two vehicles - a "land cruiser" and a "land destroyer" (again the naval flavour).(8) Martel's early paper called for no less than five different kinds - a "destroyer tank", three different kinds of "battle tank" and a "torpedo tank".(9)

In 1920 a Naval Lieutenant proposed four kinds: a transport tank (to carry 100 men - it must have been rather large!), a scout tank, a battle tank and an auxilliary tank.(10) In the same year, the General Staff stated that it required four kinds of tanks; it wanted a light infantry tank to accompany the infantry, a fast cavalry tank with a long radius of action, a heavy tank with armour proof against a .5 inch machine gun bullet and a transport tank to carry the 18 pounder gun.(11) In 1922 Sir Hugh Elles, the wartime commander of the Tank Corps, thought that an infantry tank, two kinds of "administrative tanks" and an independent tank were what were needed.(12) In 1922 Fuller called for scout tanks, "mobile fortresses", "moving supply dumps", mine laying

tanks and destroyer tanks.(13)

A somewhat more thoughtful article in 1924 discussed these various proposals. There were six different designs being discussed: the super heavy of 100 or more tons, the heavy of 35 or 40 tons, the light tank of 8 to 12 tons, the medium tank in between the heavy and light in size, the armoured car or armoured car tank (it is not clear what this last was to have been) and the very light "mosquito tank". The author dismissed the super heavy outright as impractical and thought the heavy would be useful for trench warfare and for little else. He did not think much of the medium because it "fell between two stools". He favoured the light tank and the armoured cars as being the most useful provided that their limitations were realized.(14) Martel disagreed with some of the statements made in this article. He first maintained that a tracked vehicle to carry 300 tons of supplies was a feasible proposition. His choice was for the "standard tank": the Vickers Medium (which at this time was considered to be a light tank) was, he stated, adequate for the moment but "what we require both for trench warfare and the encounter battle is a tank such as the 'Standard' tank already described."(15) This article represents both the first and the last time anyone attempted to swing British tank thinking behind a "main battle tank" for many years; Martel did not continue to advocate this policy for he was soon to be suggesting the light tank for all things.(16) The author of the first

article replied to Martel by insisting that one of his specialist tanks could beat Martel's standard tank at a specialist job every time but he did not stop to consider what would happen to one of his specialized designs if it were to meet a standard tank outside of its specialty.(17) The debate continued in 1929 but the more futuristic and improbable designs had by now been eliminated and three designs - light, medium and support tanks - were suggested in that year.(18) These three were again advocated in 1930 (19) but by then there had been sufficient experiment to remove most of the cause of the debate. The Royal Tank Corps by the late 1920's had been modestly equipped with light tanks, medium tanks and support tanks and the debate over tank types had changed its force to a consideration of the light tank for all roles.

Speculations about the future evolution of tanks provide us with some peculiar and improbable suggestions. A story by H.G. Wells which appeared in the Strand Magazine of 1903 was sometimes referred to as a "remarkable vision of future land war".(20) Wells set up a battle of some future war in which appeared "land ironclads" moving on Pedrails (a sort of large wheel with "feet"). They, of course, swept all before them and defeated an army which was long on brawn but rather short on brains; cavalrymen, in the story, found these monsters "unsporting". It was a prophetic story in some ways, but not especially prophetic about tank development for these land ironclads were extremely large with engine rooms,

catwalks around the interior and turrets bristling with guns. Not a tank, but a battleship put on wheels.(21) The notion of a super huge tank enjoyed a brief vogue in the early 1920's until common sense prevailed. An article in 1919 proposed vehicles of a thousand or more tons, protected by a screen of "mosquito craft" and "rammers".(22) Another article in 1920 proposed the same sort of thing (23) and we have seen another example or two in the articles quoted above. It is difficult to know whether these things were seriously proposed or were simply flights of fancy: no mention is ever made of what sort of engine would be capable of moving them or how they would be strategically moved. However, there were only a few articles proposing super heavy tanks and it is little more today than an amusing side light on the tank controversy.(24)

There was a small amount of controversy over the matter of tanks for India and two articles in the Royal Tank Corps Journal offered suggestions. The first proposed a small tank of six to seven tons and about 20 to 25mph. In perhaps a typical oversight, given the obsession with mobility prevalent at the time, neither guns nor armour were mentioned.(25) A later article produced a design for an "armoured car tank". This turned out to be a peculiarly shaped machine with small track sections at each corner; these tracks could be removed and replaced by wheels. Under the belly of the vehicle was a fifth track section to prevent it from "bellying".

Weight, said the author, might be a problem but it could be "dealt with, if necessary, by reducing <the> thickness of armour plate" - a revealing statement on relative priorities. (26)

Completing this survey of unusual suggestions are two that deserve tc be taken more seriously. An article in 1932, after surveying developments in infantry firepower and particularily the Hager-Ultra Bullet, (27) concluded that tanks must take to the air in their search for the safety that only speed could ensure. The writer was not speaking of a "flying tank" but an autogyro; he could be said to have been anticipating the helicopter gunship.(28) Another writer speculated on the value of of an amphibious tank to combined operations.(29) The inter war period was one fruitful in mechanical invention and, not least, in ingenuity concerning tanks.

But there was a more serious matter and one more pregnant in results and that was the growing conviction in tank circles that mobility offered the surest protection for tanks. The development in anti-tank weaponry has been outlined in a previous chapter and it has been shown that the confidence that tanks would sweep all before them waned with the invention of rapid fire infantry weapons. These developments were not lost on the Royal Tank Corps and its supporters and they turned their attention to the problem of protection. It came to be believed that armour could not be much increased because of the resultant

weight which the engines would not be able to drive. Why it should have been thought that the Vickers Medium with its 4mm to 8mm armour and its 90bhp engine represented some upper limit in armour-engine combinations is one of the mysteries of the British tank controversy. It is doubly mysterious when one looks at the (comparatively) heavily armoured French designs and J. Walter Christie's designs with their high powered engines.(30)

Like many of the other important assumptions of British tank design, the over-emphasis on mobility to the detriment of hitting power and protection began early. Liddell Hart informs us:

> In June <1916> the decision was taken to build a heavy tank of this shell proof type, and an order was given to the Daimler firm to construct a double 105-h p enqine for it. But it was never completed, as mobility was thought to be a surer protection than heavy armour.(31)

Col. H. Rowan Robinson, in an article in 1920, predicted accurately the future development of the mobility-protection debate when he suggested that, for the next few years, power would be stressed in tank design and, after that, a return would be made to what he termed the "normal" peace-time emphasis on mobility.(32) He was correct in his prediction of British practice but it is interesting to follow British developments in the light of an article which had originally appeared in a French

military journal . After surveying war time developments and various anti-tank gun designs, the author concluded that

> no imperative condition prohibits the employment cf armour of 30mm thickness or more.

The author was sceptical of the value of the light tank because he felt that every improvement in design would increase the weight of any given tank.(33) The French were to continue their development along this line and the British would continue along theirs.

The weight of armour was already seen as a problem. An article by an RTC officer stated bluntly in 1924 that speed, handiness and radius of action were more important than armour.(34) One rather far fetched solution advocated was the creation of "swinging armour" mounted on pivots so that it, by moving, could absorb the energy of a projectile. The man who suggested this believed that to increase armour would be to repeat the mistake of the sixteenth century when knights had been so heavily armoured that they could not move freely.(35) This suggestion met with the response that it deserved a few months later - swinging armour would absorb only 6% more energy than flat plates and, besides, such complicated armour would require very heavy supporting frameworks.(36) The idea did not deserve to be taken seriously but it shows the concern felt about the weight of armour. A warninq came in 1927 (although not published until 1930)

from an RTC officer. He quite accurately pointed out that high speed ought not to be pursued excessively - other things were more important and high speed could not always be used. On the other hand, having delivered himself of that perceptive comment, he went on to say that tanks should only be armoured against small arms fire and that they would have to use their speed as protection against bigger guns. The machine gun ought to be the main weapon of the tank although an anti-tank gun should be carried in case other tanks were met.(37)

1927-1928 represented a turning point in the anti-tank defence debate and the same years saw a great increase in the debate about armour and mobility. The anti-tank weapons which began to appear at that time gave a greater impetus to the search for security in speed rather than in armour. It is not a coincidence that these years also saw the Experimental Forces. The poor showing of the Vickers Medium in those exercises combined with the inability of the British tank designers to produce a better medium tank and the unwillingness of the government to buy one if it had been designed convinced many that the medium tank was not a good idea and that its handicaps of size and weight were not compensated for by its armour.

In 1927 V.W. Germains published The "Mechanization" of War and he took up the question of armour. To him the matter was simple: if armour were to be increased (and he pointed out that there would have to be a considerable

increase in order to deal with even the existing anti-tank guns), the tank would either become so large as to make it a wonderful target or so heavy that it could not move. And, even if this were done, a new anti-tank gun could easily be designed to penetrate the strengthened armour.(38) Like much of Germains' writings on tanks (and much of other people's writings as well), these pronouncements suffered from lack of imagination. Armour could be increased, the French had done so and Christie's tanks could carry a good deal of armour, and it was by no means easy to increase the powers of anti-tanks guns indefinitely and keep them reasonably mobile. He repeated all this in an article in 1928 (in fact, Germains had only one thing to say, but that did not deter him from saying it often).(39) In 1928 another article discussed firepower and armour. The firepower of a tank was often described as "considerable"; but was it really? The author thought that, given the effort expended on armour, the firepower of tanks was not very great. Further, in future wars, only big guns might be met and tanks would find themselves armoured against the non-existent threat of small guns but not against the real threat. He concluded with a warning that sums up much of the thought on the matter at this time:

> Mechanization will restore the scope for generalship...provided that we do not throw away its value by weighing down our armies with useless armour.(40)

The performance of the Vickers Mediums had a good deal to do with this loss of faith in armour. In 1929 Rowan Robinson was so disappointed with their showing in the exercises that he decided that medium and heavy tanks had no future at all - they were simply too large a target and they could not protect themselves with armour. He stated his conviction that armoured cars offered the only future for mechanization. Smallness was the only answer - the gun had won the gun-armour race.(41) In the same year Martel constructed, in theory, a mechanized force with no medium tanks in it at all - gun power was to be provided by three pounder guns on light carriers. The reason was, in his words:

> I am not convinced of the capability of medium tanks in fighting against anti-tank weapons.(42)

Wavell, in the Staff Conference of 1929 called to consider the results of the Experimental Forces of 1927 and 1928, suggested that in future tank designs mobility should be to firepower and armour as 3:2:1.(43) Armour, in his opinion, should be the lowest priority for tank designers. Weight and mobility were not compatible and, if mobility were to be stressed, weight would have to be cut down and that meant less armour. It also, in at least one man's opinion, meant less guns. An artillery officer stated in 1930 or 1931:

> The weight of the tank itself has already reached its maximum when cost and speed

> requirements are considered.
>
> Tank armament is tending to become lighter in calibre rather than heavier, so great a handicap is the weight of weapons and ammunition.(44)

Not only were British tanks without sufficient armour but they were becoming dangerously lightly armed.

The qualities desired in designs of AFVs were set out by the Mechanical Warfare Board in its report for 1931. Speed, power of manoeuvre, negotiation of obstacles, circuit of action, efficiency, comfort of crew and reliability were to be stressed.(45) There was no mention of armour or, for that matter, guns in this list. In vain came another warning that high speed could be used only on good roads and was of little military value - there was a limit on speed beyond which the crew could not function cross-country (46), mobility was to be preferred. An Engineer, in one of the most unimaginative articles to appear on tanks between the wars, argued that not even high speed could be achieved. The central point of tank design was the engine. He produced logarithmic curves which purported to show that it would take 50hp to go 7mph, 90hp to go 15mph, 200hp to go 22mph, 300hp to go 27mph and that a 12 3/4 ton tank could never get to 30mph. Therefore, given the internal-combustion engine, the fast tank was simply not possible.(47) His figures, of course, were wrong.(48) This bald statement attracted some controversy in later issues of the journal. One response

was that no one could afford to wait for the perfect engine to appear (49) but a better one pointed out that aero engines built for the Schneider Trophy competition developed 2400hp for a weight of only 1200 pounds.(50)

For some reason Fuller and Liddell Hart did not contribute to this debate. The only suggestion of Liddell Hart's views is to be found in a report on the 1931 manoeuvres in which he said that the Tank Brigade had, for the first time, used armour as an <u>additional</u> security to mobility.(51) This suggests that Liddell Hart accepted the doctrine that armour could offer but little security.

Mobility was seen as the most important factor of tank design. It was the mobility of tanks that had changed warfare and, if armour interfered with that mobility, it was the armour that must go. The light tank was the result - a series of vehicles armed with machine guns with armour just capable of stopping a rifle bullet at about 500 yards. A vehicle that, as war experience was to show early, had almost no military value at all: it could not protect itself except by running away and it could not run away fast enough; a tank, that when it got where it was needed, did not have the armament to carry out its function. The light tank was a tank designed to shoot up infantry columns; when there were no infantry columns offering themselves, the light tank could do very little. Three factors - mobility, anti-tank guns and the medium tank problem all came together to produce the light

tank. It is now appropriate to consider the larger tank designs which preceded and led to the light tank.

The following pages will contain technical detail and specifications concerning the various British tank designs. Such a section is essential in any consideration of the tank controversy. The Royal Tank Corps had certain doctrines which it wished to prove and it could prove these only by demonstration. Argument was sufficient to a certain point, but beyond that point, argument must give way to demonstration by practical example. This practical example could be given only by the tanks available to the Corps and therefore, their characteristics must be described.

The first of the post war designs were those of Lieut. Col. Philip Johnson at the government established Department of Tank Design and Experimentation. The war had shown the need for a truly fast tank and Fuller's "Plan 1919" had been predicated upon such a design appearing.(52) The requirements for such a tank were a maximum speed of 20mph, a circuit of 200 miles and a weight of not more than 20 tons. It appeared that Johnson was the man who could design such a tank. The approach to higher speeds lay through improvements in suspension, for the early tanks had been unsprung and much of their engine power had been dissipated in the friction of their crude suspensions. Johnson had begun experiments in sprung suspension in 1917 and 1918 and is said to have attained

the speed of 30mph in a modified Whippet tank.(53) From these early steps he developed a "cable suspension" and flexible tracks and had successfully displayed these on a stripped down Mark V.

His first complete design was the Medium D which appeared shortly after the war. This tank weighed, in its early configuration, 13.5 tons and was about 30 feet long. This tank was subsequently modified, or another was built with amphibious capability, and was known as the Medium D**. This latter was a little bigger and heavier and more powerful. The Medium D was capable of speeds in the range of 20mph and the D** of speeds in the range of 30mph. Both of them were apparently equipped with horizontally flexible tracks and a cable suspension. In 1920 Johnson began work on a 7 ton tank for the infantry accompanying role - the Light Infantry Tank. This vehicle was capable of 30mph speeds and was similar in appearance to the Medium D. The Light Infantry Tank was equipped with the final form of Johnson's flexible tracks - the completely flexible "snake track".(54)

Johnson's ideas were brilliant in principle but it seems (although there is some disagreement among the sources) that they could not be made to work in practice. Two accounts in 1923, after a display of the Medium D and the "snake tracks", stated that the devices performed very well.(55) But these two reports may be discounted on the grounds that they were written after the authors witnessed

carefully staged performances. Probably more accurate is an article on the "snake tracks" written in 1930 which said that the universal joints connecting the track links were an unsolvable problem - each joint had to be continually and carefully lubricated and the seals of the joints could not keep dirt and grit out and keep the lubricating oil in.(56) A further problem was that the all important cable or chain in the suspension system could break and, if it did, the suspension would be completely useless. An historical account in 1927 stated that it was no exaggeration to say that, for every hour's running, the Medium D had spent a month in the workshop being overhauled.(57) It seems clear then that the Medium D was very unreliable and that the Light Infantry Tank was damned by its unworkable snake tracks. In any event, although there have been other attempts to make the system work, no one has ever been successful with Johnson's ideas. All further work on the projects was stopped when, in 1923 as an economy measure, Johnson's design department was broken up.

In 1924 the Comptroller and Auditor General summed up the story. In May 1919 the War Office had taken over tank design from the Ministry of Munitions and had ordered 75 of the Johnson designs. After the actual model had been produced, this order was reduced to ten and, in February 1922, in face of mounting mechanical problems, further work on the tanks was suspended. What tanks had been produced by the department were eventually declared

useless for either war or training and they were disposed of. The whole programme had cost 267,000 Pounds and, it was feared, very little of that loss could be recovered. The mistake had arisen from the fact that the tanks had been ordered before a prototype had been built.(58)

The Army had shown great interest in the design and had, in fact, stopped further production of the Medium C in favout of continuing with the Johnson designs. An Army Council meeting in October 1920 (before the Light Infantry Tank had appeared and only shortly after the first Medium D prototype had been completed) was very taken with the Johnson designs. The Medium D was approved by the General Staff as suitable for the fast cavalry tank with a long radius of action which it required and it was felt that a vehicle with sprung track weighing about six tons would be suitable as a light infantry tank, a tank for India and a vehicle to transport the 18 pounder gun.(59) That is to say, the Army Council and the General Staff in 1920 had put a good deal of trust in the Johnson promises. But, as it turned out, this trust was misplaced and the designs were unworkable.

For the purpose of this thesis, the important points about Johnson's designs are as follows. Between 1918 and 1923 he designed and built a number of tanks of which the most important were the Medium D and the Light Infantry Tank. Both of them possessed novel features of which the two most important were sprung suspension depending on a

cable or chain and flexible tracks. The General Staff was most impressed by these designs and, before they had been tested thoroughly in the one case or built in the other, ordered quite a large number and instructed Johnson to begin work on other types. Johnson's suspensions and tracks did not work properly and, eventually, work was stopped on the designs. Finally the department was closed down and all the surviving models have since disappeared.

In 1920 the firm of Vickers was asked to construct a tank.(60) This it did and its design appeared in 1921. Named the "Light Infantry Tank" and seen as a successor or alternate to the Johnson Light Infantry Tank, this design incorporated a number of interesting features. It possessed hydrostatic transmission, sprung suspension and, for the first time on a British tank, a fully rotating turret. The transmission was not successful because of low efficiency and the Vickers Light Infantry Tank was abandoned.(60) Nevertheless, it had shown that Vickers could design a tank and the company was asked to try again. The next design appeared in 1922. This was the famous Vickers Medium of which 160 to 200 were produced.(61) Production began in 1923 and the Vickers Medium remained the only tank in service with the RTC (except for some prototypes) until the arrival of the light tanks in the early 1930's. It was the only big tank in service until the appearance of the A9 Cruiser Tank Mark I in 1937. The Vickers Medium was the tank with which the Tank Corps had to prove its convictions and

develop its tactics. Indeed, because of its long service, it has had more to do with the formation of British tank thinking than any other tank before or since. Its effects on the anti-tank and mobility-protection problems have been alluded to above and it is now time tc look closely at it.

The first models of the new tank (originally named "Light Tank" but renamed "Medium Tank" in 1924) were delivered to the Tank Corps at Bovington Camp, Dorset in 1923. In shape the Vickers Medium was a high square box with a forward driving ccmpartment. It was 17 1/2 feet long, 9 to 10 feet high (depending on which model is considered) and a little over 9 feet long.(62) The engine, a 90bhp Armstrong-Siddeley V8, sat beside the driver in an asbestos walled compartment. On top was a round turret with a sloping roof upom which perched a commander's cupola. The tank had vertical sides and rear while the front was a complex arrangement of flat plates set at various angles of slope. Above the driving compartment sat the small cupola through which the driver looked and entered his position. The rest of the crew entered the tank through a door in the rear of the body. There was very little room in the tank: four men - commander, machine gunner, gunner and loader - shared a space about six feet square in which none of them could stand erect except the commander. There were no seats in the fighting compartment and a long trip in one of these tanks must have been extremely uncomfortable as the crew had to

crouch most of the time.

The track assemblies were mounted in an armoured box (the armour of which was extended almost to the ground in the Mark II). Initial trouble was given by the 24 small bogie wheels which were mounted on five units on each side. The axles of the original design kept breaking and a new road wheel arrangement was designed in 1931 (the box bogie) which ended the problem. The first tracks were built by rivetting a plate to connecting pins but these proved unsatisfactory and were later replaced by the Number 3 track which had the sole plate and the connecting pins cast in one piece.

The armour plate of the Vickers Medium was rivetted to a frame which provided the rigidity of the body. This is the least satisfactory way of fixing armour plates together. But no other alternative was possible - neither cast nor welded armour was in use at that time. But as the armour was made the basis of later criticism, its disadvantages should be described. In service the armour plates, because of vibration, tended to come away from their supporting framework thereby opening gaps in the hull protection. This made the Vickers tank subject to "bullet splash" - bullets hitting the armour flatten out and melt, this molten lead then could find its way into the tank through the gaps in the protection - a serious irritation to the crew if nothing else. Another problem with the rivetting method was that rivets could be shot

away by hostile fire, further weakening the armour protection. The rivet hcles were made by drilling the armour when it was soft and then hardening the plates - a difficult process that often led to cracks and other imperfections in the plate. The armour itself was homoqeneous plate, in the first models 6.25mm thick and in later ones 8mm thick.

The light armour of the Vickers Medium was bad enough but worse was the distribution of its fuel tanks and ammunition stowage. In the front of the tank, behind a vertical plate was a small tank of 8 gallons of fuel and, at the rear, also behind a vertical plate, was the main petrcl tank containing 90 gallons. 34 rounds of ammunition were stowed on clips fixed to the main petrol tank. Between the rear petrol tank and its attached ammunition and the crew, there was no protective wall. The tank was extremely dangerous and the vertical plates of armour offered little protection against the risk of a hit in the fuel or ammunition stowage.(63)

The armament of the tank, and that of subsequent large tanks, consisted of one three pounder (47mm) quick firing gun and a number of Vickers or Hotchkiss machine guns. The three pounder was 32 calibres long with a muzzle velocity of 1,750 feet per second and a maximum range of 7,000 yards and with a well trained crew, it could fire 15 rounds a minute. The gun fired armour piercing, high explosive or case shot. The armour

piercing round was in fact a small high explosive round filled with 30.1 grams of "lyddite" or "shellite"; the high explosive shell (which was too small to be satisfactory) had a filling of 58.5 grams of explosive; the case shot was designed to break up as it left the gun. Normally, for practice, the gun fired a flat headed sand filled shot with a reduced charge. The Vickers Medium was equipped with from three to six machine guns pointing out of various parts of the tank. A "close support" version was later built in small numbers which had a 3.7 inch mortar firing a 15 lb shell, usually smoke but occasionally high explosive.(64)

No less than eight important and seven experimental versions of the Vickers Medium were built. There were about 80 Marks I and IA (the Mark IA had a bevelled rear plate on the turret in which could be mounted a machine gun fixed for anti-aircraft fire). The Mark IA* can be recognized by a co-axial Vickers machine gun, the absence of Hotchkiss machine guns (which proved to be unsatisfactory because they jammed) and the "bishop's mitre" commander's cupcla. In 1925 the first Mark II appeared. Externally, this may be distinguished from the Mark I by extended armour skirting on the suspension and the repositioning of the driver's cupola on the top of the hull so that it looked bulkier and higher than the Mark I. The Mark II* had a co-axial machine gun and a bishop's mitre cupola moved farther to the rear than it had been on the Mark IA*. The Mark IIA appeared in 1930 and was

externally little different from the Mark II* save that it did not have the anti-aircraft mounting. In 1932 a number of Mark IIs were converted to co-axial machine guns and a very large armoured box was attached to the rear in order to house a radio (65); this model became known as the Mark II**. The last important modification was the Mark IIA CS which was the close support tank with the 3.7 inch mortar already mentioned.(66) It should be stressed that these different versicns were all essentially the same tank and that only a trained eye can recognize the subtle differences between one model and another.

In addition to these more important variants of the design, were other versions either experimental in purpose or in such limited production as to be relatively unimportant except as illustrating the variety of experiment. The Light Tank Mark IA Special (L) India was an all machine gun armed version produced for India and they were the vehicles which featured in that disastrous trip to the barracks described in an earlier chapter; for some reason these tanks were never reclassified as medium tanks. In 1926 an experiment was made which consisted of attaching a pair of wheels to either end of a Mark I; when tracked travel was desired, the wheels could be swung out of the way. This was done in response to the fact that track life was very short (before the Number 3 Track appeared) and it was hoped that the tanks could travel on their wheels and thereby save their tracks. Only one was so modified and the experiment was not a success beca use

the wheels were too clumsy and affected the tank's performance. In 1928 five Mark IIs were modified with asbestos sun screens and sent to Egypt for tropical trials. One Mark II was produced in 1927 which carried bridge sections on the side of its hull. A command tank with fixed turret and dummy gun appeared in 1931 and there had been a similiar experiment with a turretless tank for command purposes in 1928. Finally, four Mark II*s were modified and sold to Australia in 1929.(67)

The Vickers Medium chassis was used for a number of other developments which, since they were not tanks, do not concern us here. But one, the Birch Gun, deserves mention. This was a Medium Tank chassis upon which was mounted an eighteen pounder gun. Only three of these were produced between 1926 and 1929, each one different from the others in details of screens and armour.(68) They were the responsibility of the Artillery and the British did not follow up their early developments with the self-propelled gun with further examples and in the Second World War used American and Canadian designs for this purpose.

Despite the fact that the Vickers Medium can be and was severely criticized from a number of aspects, the RTC was fortunate to get it. In contrast to the French who were hampered by their large stocks of the obsolete Renault FT, the British began with a modern tank. The Vickers design was faster than any other tank design in

use; it had sprung suspension; it had a fully rotating turret and perhaps most important for the later complex exercises, it had three men in its turret one of whom was free to command the tank. Therefore, in all the criticism which came from its users, it must be remembered that, with any other design of the 1920's, the RTC would have had much more to complain about. The Vickers Medium may have been an unsatisfactory design in some respects, but there were many worse.(70)

The Royal Tank Corps was glad to see it as, indeed, it would have been glad of any machine which would replace obsolete war time stocks. In 1925 Fuller was confident that the Vickers Medium would replace the cavalry.(71) In 1926 a paean of praise appeared in the Royal Tank Corps Journal. The tank was "the speediest ground weapon in the world" and it possessed "tremendous hitting power". It was easy to conceal from observation and it could break off any action when it suited it.(72)

But this euphoria did not last long. Pile told Liddell Hart in 1928:

> The medium tank is so wide, so cumbersome and so expensive, as well as so unreliable when called upon to cover long distances on macadam roads, that something cheaper and less cumbersome if less powerful, would appear necessary.(73)

The experiments of 1927 and 1928 revealed the Vickers

Medium to be unsatisfactory. An article written about the Experimental Mechanized Force stated:

> They are neither flesh, fowl nor good red herring. They are too slow for reconnaissance work, and also too bulky. They are not sufficently armoured for battle work, and again are distinctly on the slow side. They are uncomfortable to live in...(74)

General Burnett-Stuart, under whose overall command the Experimental Forces had been placed, said in his report:

> Also the low speed of the present Medium Tank has slowed down the whole force.(75)

Brigadier Collins, the Forces' commander, agreed that the mobility of the Forces had been limited by the tank.(76) An article in 1929 agreed that the Vickers Medium was neither whippet nor heavy tank. It had been designed, the author said, as an infantry tank but, if it went fast, it lost the infantry and, if it slowed down to allow them to keep up, it would be shot to pieces.(77) Major General S.C. Peck, then Director of Mechanization, further criticized the tank in 1929. The chief disadvantages of the Vickers Medium were that it was difficult to drive, an unsteady gun platform, badly ventilated, the vision from it was poor, the machine guns had small arcs of fire and there was a great fire risk from the positioning of the fuel.(78) Hobart, in his report on the Tank Brigade for 1934, condemned it as a "death purpose" machine and stated

that it was uneconomical even as a training machine.(79)
He returned to the attack in the following year:

> The present tank is quite unfit for war. It is not bullet-proof and has no protection against <bullet> splash. Its petrol tank is inside the fighting chamber. The time and money spent on its repair make it uneconomical even as a training machine... Battalions are still equipped with a machine that is thirteen years old and out of date in every respect.(80)

The principal complaint was its speed or, rather, lack of speed. Some attempt has been made to inflate its maximum road speed but these attempts do not convince. Liddell Hart said that he had "on various occasions timed it on the road to be travelling at close on 30mph".(81) It seems that he witnessed a rather artificial display:

> ...the fastest Mark I, the C.O.'s tank of the 2nd Battalion, RTC, was on many occasions timed at 25 mph on good going.(82)

The fact that a prize tank, very carefully maintained, could travel on a good road, for short distances, at 25 to 30mph says very little about actual performance let alone cross-country performance. And it was cross-country performance by which we must judge it: everyone knew that armoured cars were much faster on roads than tanks, but it

was the capacity of tanks to leave those roads and strike out over land that justified the caterpillar track with its slower road speeds. Martel, who also observed many a tank in action, had this to say about the tank's normal speeds:

> The present Vickers tank is a light tank; it has a speed of nearly 20mph on a road, but over ordinary bumpy ground the speed falls to about 8 or 9mph.(83)

In fact the normal road speed was even less than the figure given by Martel. We are informed that up to 12mph the noise level in the tank was "not bad" but "above that speed it develops into a scream and rapidly becomes unbearable".(84) Obviously, no crew could endure that for very long especially when the noise would combine with the lack of seats to increase the discomfort. In practice, its normal road speed was even lower: the Mechanical Warfare Board, reporting on the Medium Armoured Brigade exercises of 1930, had this to say:

> It was found that the most economical marching speed could be attained by the lead tank setting a speed of 10mph. A halt of a quarter of an hour was made in every hour to carry out minor maintenance duties.

That was an average speed of only 7 1/2 to 8mph on roads; higher speeds could be run but "at the expense of mechanical efficiency". The Report stated that "The time

limit of a normal day's march was found to be seven hours...A normal day's march for the Brigade could therefore be reckoned to be 50 miles". (85) The Standing Orders of the Experimental Mechanized Force of 1927 had recognized this when the vehicles were organized into three groups on the basis of speed with all the Vickers chassis in the slow group held to 7mph and 30 miles a day. Liddell Hart criticized these orders and accused them of being "too well designed to keep warfare static" (86) but the orders had reasons behind them. The tank's speed across country has not been described except in what Martel stated, but it is possible to give a rough calculation based on the engine's power. From this it appears that the maximum speed of the Vickers Medium on soft clay would have been from 4.5mph to 5mph. (87)

The reason for this slow speed is simple - the tank was underpowered. It weighed 12 to 13 tons and for this weight it had but a 90 horsepower engine. The early models had a power to weight ratio of 7.7 and the later, heavier versions, a ratio of 6.7. This was simply not enough although it was not as bad as some contemporary writers thought. (88) The low power to weight ratio of the Vickers Medium meant that, not only was speed low, but acceleration was slow and that the tank would not have the reserve power to get itself out of ditches or very muddy ground.

It was with this slow, ill armed, poorly designed, vulnerable, unreliable and dangerous tank that the Royal Tank Corps attempted to work out its doctrines and impress upon observers its vision of the future. It is small wonder that people not already "converted" remained sceptical of the future potential of tanks.

Concurrent with the Vickers Medium was another tank which, although more advanced in design, was never to be produced. In December 1922 the War Office asked Vickers to undertake the design of a heavy tank and, after two sets of drawings had been made, the detailed specificaticns were set out in 1925. The tank as eventually built was named the A1E1 or Independent. The name may be a clue to its role: perhaps it was to be a tank for the "independent" role first suggested by the Military Members of the Army Council in 1919. The role of an independent tank force was to force or exploit success and for this a machine with speed and endurance was needed.(89) Or perhaps it was to be a heavy tank as the Mechanical Warfare Board called it in 1929.(90) There is some question about the purpose of the Independent and, in any event, only one was ever built. It is also not certain whether the design was to have been the prototype of a series or a single experimental vehicle:

> No clear guidance on this point was ever given, despite the fact that it was of great importance both to the test organization and to the manufacturers.(91)

The Vickers Independent was larger and heavier than the Vickers Medium and was armed with no less than five turrets - four with machine guns and one with the three pounder. It weighed two and a half times as much as the Vickers Medium and had much thicker armour. It had been desiqned with the assistance of RTC officers and embodied a number of new features: the crew communicated internally with laryngaphones, the controls were hydraulically assisted, one of the sub turrets had its machine gun fitted for high angle fire and the steering was by means of a wheel.(92) It was well designed inside and the interior was sufficiently roomy for its eight man crew. But it was very large indeed: thirty feet long and nine feet high, it would have made an easy target for enemy gunners and its armour, although an improvement on that of other designs, was thin at a maximum of 28mm and a minimum of 8mm. Its maximum speed was low at 20mph and it had the same three pounder gun as the Vickers Medium. Nonetheless, as an exercise in engineering and as a testbed for new devices, it was a valuable machine and was probably somewhat in advance of most foreign designs.

Its suspension gave trouble (suspensions were a difficult and largely unsolved problem in the 1920's) and the Independent spent most of its time in and out of the workshop. It made its first appearance at a display arranged to impress the Dominion prime ministers in November 1926 and by January 1928 had amassed about 200 miles running experience.(93) In 1932 it was still being

worked on and its suspension was still causing trouble.(94) By 1933 trials of this tank had stopped and the design had been abandoned. By that time it had run about 630 miles and had cost the taxpayer 77,400 Pounds.(95) After standing guard at Bovington Camp in 1939 and 1940, it was retired to the Museum where it can be seen today.

The next large tank to be designed was a medium tank. In May 1926 the Tank Corps was asked to prepare its views on the design of a new medium tank and these were duly forwarded to Vickers Armstrong which produced a mock-up in March 1927. The new tank, following the precedent of the Independent, had one main turret with the three pounder and two sub turrets with machine guns. Two vehicles were ready for trials in 1928 and a third followed shortly after. In the trials it was determined that the gunnery layout was unsatisfactory and that the tanks provided a very unstable platform for firing on the move (which was the accepted RTC practice at the time). Accordingly Vickers Armstrong produced another design very like the first which appeared about 1930. Three of the last were built. The first three were named A6E1, A6E2 and A6E3 and the second three were named Medium Tanks Mark III E1, E2 and E3. From their weight, they were all nicknamed "Sixteen Tonners". Trials continued, with the customary suspension problems, until about 1933 and at least one of them was used (as the headquarters tank) in the 1934 Brigade manoeuvres. The Sixteen Tonner was an advance on

the Vickers Medium in terms of armour, which was 9 to 14mm and in its maximum speed of 30mph. It was also much better laid out inside. But it had the same weapons and, as its long period of trials indicates, it was much bothered with mechanical problems. Nevertheless, it is generally considered to have been a good design (except for the matter of armament) but it was too expensive for the economic climate of 1933.(96)

The last design for a big tank before 1937 was the A7. But this tank does not concern this thesis because work began on it in 1927 and proceeded very slowly until the pilot model appeared in 1937 by which time it was manifestly out of date.

Therefore, between 1923 and 1933, three large tanks were available for equipping the Tank Corps - the Vickers Medium in 1923, the Independent in 1926 and the Medium Mark III in 1933. All of these were designed by Vickers Armstrong and all of them were similiar in certain important respects. Their armaments were identical and not very good - the Independent weighed 32 tons and that was a lot of tank for so small a gun. They were all under armoured although the Independent with a maximum of 28mm came the closest to being well armoured. But the Vickers Medium could be penetrated by every make of anti-tank gun at 2000 metres, the Medium III by every gun at 1000 metres, and the Independent by all at 500 metres and by many at 1000 metres in the thickest armour; all could be

penetrated in their weakest armour at 2000 metres.(97) As to power, while the later two were better powered than the Vickers Medium, they were not powerful enough at 11.5 horsepower per ton. Road speed had been much improved in the later tanks but the real problems with the two more modern designs were reliability and cost effectiveness. The Independent gave continuous trouble and was never out of the workshop; the Medium III was more reliable but, even so, it was five years before any were released to the Corps. But cost was telling: the Vickers Medium cost about 8,000 Pounds without guns and the Medium III cost about 16,000 Pounds.(98) The solitary Independent had cost nearly 80,000 Pounds by the time its development was stopped. The Medium III was a better tank than the Vickers Medium; but was it twice as good? It does not seem so; two Vickers Mediums could bring to bear two three pounders and six or seven machine guns as against half that number of exactly the same weapons; in the first case the armour protection was not adequate but neither was it in the second. All that the Medium III had to offer to compensate for its doubled cost was an increase in the road speed. It was not worth it.

The above descriptions of tanks should make it clear that Vickers Armstrong was not capable of making a good tank that the British Government was prepared to pay for. So far as heavy tanks were concerned, the French were far ahead of the British in terms of armour and gun power - the two characteristics most emphasized in a heavy tank.

The designs of J. Walter Christie in the United States were superior in terms cf mobility to any British design. Most of Christie's productions were only prototypes but they were taken up by the USSR which bought three tanks from him. The resulting designs were seen by Martel and Wavell when they visited the Soviet Union in 1936; they were so impressed by what they saw there that they persuaded the War Office to buy the one surviving Christie model which was landed in England in November 1936. (99) From this beginning were designed the British Cruiser tanks A13 of 1937, the Covenanter of 1937 and the Crusader of 1938. The Christie suspension continued in British use until the excellent Comet of 1944. Why the British did not buy a Christie model before is not known for it is clear that the Vickers Medium was a design which hampered the development of the Tank Corps and that the other big designs before 1935 offered some improvement but at too great a price.

Three threads have now been traced through the period - the over emphasis on mobility, the fear engendered by the production of light anti-tank guns and the problem of the Vickers Medium and the lack of an acceptable replacement. To these three must be added a fourth - money. We have seen that the confidence of the Tank Corps had been eroded by develcpments in anti-tank guns; we have seen that it was believed that armour could offer no security and that only a tank which could run away could be safe from these guns; we have seen that medium tanks

could not be designed that were both armoured and fast and that the existing medium tank was not adequate; we have seen that the Army was under continual pressure to economize. The cause of all these problems was one: the medium tank could not survive against the guns and it was too expensive; the answer to all these problems was one: a cheap tank which could survive against the guns must be built. The problem was the medium tank: it was too large a target, it could not run away and it was too expensive; the answer was the light tank: it was a small target, it could run away and it was cheap. The Experimental Force exercises made manifest the problem of the medium tank but also pointed towards the solution, for present at the exercises were the first light tanks.

The light tank was virtually the single handed invention of Martel. He described how he had come to think of it in three articles between 1927 and 1928. The light tank, apparently, had been suggested in the war but the idea had been lost until Martel revived it in 1925. He did so because he reasoned that the existence of a cheap design would enable more to be built and he was certain that developments in anti-tank gunnery would force the larger tanks to "disperse" into a number of smaller tanks. Accordingly, he decided to build one himself in January 1925 in order to convince people that they could be made. Using commercial parts, for which he paid himself, he produced a one man model in his garage for less than 500 Pounds.(100) The Morris Motor Company

expressed interest and eventually produced seven two man models for the Experimental Mechanized Force in 1927. The firm of Carden and Loyd also took up the idea and produced another eight for the Force. The Morris-Martels, following Martel's original, were too high and in other ways not a very suitable design, whereas the Carden-Loyds had a low centre of gravity and an inconspicuous silhouette. The Morris-Martels soon disappeared and the light AFV field was left to Cardon-Loyd which was in turn taken over by Vickers Armstrong in 1928. The Carden-Loyd design continued with a variety of models of which the Mark VII had a turret. At this point, light AFV design divided into two different streams. The turretless vehicles became known as "machine gun carriers" and were assigned to the infantry; this line eventually resulted in the Universal Carrier of the Second World War.

We are here concerned with the turreted version - the light tank. The Light Tank Mark I appeared in 1930 and was quickly followed by Marks II, III and IV by 1933. These four marks were in limited production and it was not until the Light Tank Mark VI appeared in 1935 that any large number were produced. We are here concerned with light tanks before 1933 and it is possible to describe the first four designs together as they were very alike. They all had a two man crew and weighed about four and a half tons. Their speed was over 30mph, the first three had 60 to 65hp engines while the fourth, which was the fastest, had an 88hp engine (just less than the 90hp engine of the

13 ton Vickers Medium). Their armour varied from a minimum of 4mm to a maximum of 10mm or 14mm; they were all armed with one Vickers machine gun.(101) Their design was a private venture from first to last:

> It could almost be said that light tank design evolved itself. No military specification had been drawn up but the product of the evolution appealed to the General Staff: it was a tank, it was cheap, it was easily produced and did little damage <to private property during manoeuvres>.(102)

Not only did the light tanks appeal to the General Staff but also they appealed to the Tank Corps. At first there was some confidence that the original turretless designs might replace the footbound infantry. Liddell Hart in 1926, upon seeing Martel's model, believed that the "one man tank" might some day replace all fighting on foot (103) and Martel was confident of similiar results.(104)

They made a good showing in the manoeuvres of 1927 and Pile's fast group of armoured cars and "tankettes" (a name popular for a time for the original models) moved 40 miles in one hour and captured some valuable bridgeheads. Liddell Hart described this action as "a racehorse pulling a plough" - the plough being the rest of the Mechanized Force.(105) Another observer gave it as his belief that

the tankettes seemed to offer better value than the tanks.(106) The tankettes were originally seen as providing reconnaissance or as acting as a screen for the medium tanks. Rowan Robinson felt that, at last, there was a means of providing close reconnaissance for modern armies which had previously had to be done by cavalry forces.(107) Liddell Hart spoke of their leading the attack "to pave the way by drawing the enemy's fire and testing his defence"; if the defence should prove strong, they could hold up as a string of "minute pill boxes", if weak, then they were to rush ahead "hell for leather".(108) This was typical of the sort of wishful thinking such machines seemed to engender - pillboxes are normally more thickly armoured than 4mm and it is difficult to imagine how a fast, bucketing tank can "smother" an anti-tank gun whose crew is protected by an armoured screen. Nevertheless, the tankettes seemed to offer more promise than the unfortunate medium tanks: Montgomery-Massingberd thought in 1928 that a future Armoured Force ought to have more tankettes in it.(109) In 1928 Liddell Hart was more enthusiastic still:

> ...the fighting part of a true Armoured Force should be mainly composed of light tanks, such as the new Carden-Loyd, with a proportion of 'gun tanks' such as the new 16-ton Vickers...(110)

In 1929 he reported that most people seemed to like the light tanks and found them to be effective.(111) Martel,

who was the chief publicist of his invention, wondered in 1929 whether large tanks could effectively smother anti-tank guns with machine gun fire. He thought that they could not and that the light tank was therefore the answer. He then suggested an Armoured Force composed exclusively of light tanks and armoured cars with medium tanks "more or less in the role of heavy artillery".(112) He continued this advccacy of the light tank in 1930.(113) A war game in 1931 suggested that, in favourable circumstances, the light tanks armed with .5 inch machine guns could put up a fight with medium tanks. The exercise was done in the form of a race which the light tanks, with their superior speed had won; they were then adjudged to have held up the medium tanks long enough for their infantry and anti-tank guns to have taken up position.(114)

The light tanks were also welcome in India. Four Light Tank Mark IAs were sent to India in 1931 from where it was reported that they had proved successful. The report mentioned the apprehensions of the Indian establishment about the advisability of tanks caused by the "short life and unsuitabilities" of the Vickers Medium, the last tank sent out for trials.(115) Three other articles took up this point and they were generally favourable to the employment of light tanks in India.(116)

The light tank proved itself very popular in the British Army. In the next chapter, the rapid takeover of

armoured formations by the light tanks will be described until by September 1939 there were about 1000 light tanks in British service and only 146 larger tanks.(117) All that need further be said about British light tanks is this: between 1938 and the 1970's, only one other light tank was designed in Britain - the war proved the light tank to have been a blind alley of tank design.(118)

British tank design, both theoretical and actual, has now been surveyed from the end of the war until 1933. During this period, the British lead in design slipped gradually from its early preeminent position. The rise of the belief that mobility was to be stressed above the other factors of hitting power and protection has been noted. British designs have been described, that of the only medium tank in service in some detail. The Vickers Medium has been discussed and the defects of its design and performance have been indicated; it has been shown that the tank was unpopular among its users. The defects of this tank cannot be stressed too much - it was the Vickers Medium that the Tank Corps had; if the Corps wanted to show that it could take over the battlefield, it was that tank that had to demonstrate the taking over in practice. This it could not do: it was too big, too noisy, too vulnerable and too unreliable for conviction. Subsequent large tank designs have been described and it has been shown that they offered little improvement, cost

too much and, in any case, it is doubtful whether they could have been in production before 1933. The combination of many factors, the anti-tank problem, the mobility problem, the medium tank problem and the financial problem all led to the same end - the light tank. The early light tanks have been described and it has been shown that they were eagerly accepted by the Tank Corps and that some wished to replace the medium tanks entirely with the light tanks.

CHAPTER FIVE

Experiments and Formations

The preceeding chapters have described how the British Army decided to keep on with the development of tanks and have described the tank designs which were available. Granted the decision to have tanks and given the existing models, how were the tanks to be organized? This question was not completely settled by 1933 and, in many ways, it is a question which continues today. But by 1933 a good deal of progress had been made on the matter. By 1933 a permanent tank brigade had been formed and, although greviously short of equipment, this was a considerable step forward. By 1933 the communication and control problem had been, if not completely solved, considerably reduced. By 1933 two official handbooks had been written about the roles and organization of armoured forces. In fourteen years a good deal of progress in orqanization had been accomplished.

It got off to a slow start, however. Five years passed before the Tank Ccrps was accepted as a permanent addition to the British Army. From this beginning the rate of progress quickened: in 1926 preparations began for the first of the experiments which had been proposed in 1919 and, in the next two years, an experimental

mechanized force was put through its paces. As a direct result of these experimental formations, after a year's pause in which to test the infantry cooperation role also proposed in 1919, a brigade was assembled. The brigade continued with experiments in 1930, 1931 and 1932 and was permanently established in 1933. It may be objected (and was at the time) that this took too long and perhaps it did. But it must be remembered that almost everything concerning tanks and mechanization was in its infancy and that there were problems that had never been solved or dealt with before. Tanks had to be designed and developed, tank crews had to learn to drive and maintain them, drills had to be created and worked out, there were grave control problems, there had to be continual exercises to test various roles and organization plans, formidable logistic problems had to be solved, the crews had to practise the new skills required, commanders had to accustom themselves to this new arm. Fourteen years is not a long time to build up a practical working tactical system for a new invention.

In what follows, we shall begin with the establishment of the Corps and the decisions made in the early 1920's which were to foreshadow later development. This will be followed by a section on the Experimental Mechanized Force of 1927. This experiment, and its 1928 continuation, was an epochal date in the history of the RTC. From it stemmed the disappointment with the medium tank and much of the downturn in tank enthusiasm noted; on

a more positive note, the experiments established the utility and validity of the tank force concept. They led to the continuation of the experiment in the shape of the tank briqade and the establishment of that formation. The chapter will close with an examination of the journals and the little that was published concerning future organizatien.

In November 1919 the Army Council agreed in principle to a memorandum from its Military Members. In it, the Military Members had made a number of recommendations concerning the future organization of the Tank Corps. Two tank forces were needed they said: an "independent force" whose role would be to force or to exploit success - whether this force was to be truly independent of the other arms was a matter to be settled later - and an infantry tank force to be subordinate to the infantry. It was suggested that an experimental tank school be set up in Wool, Dorset in 1920 to prepare the way for the formation of tank battalions. Instructors for the school were to be found from officers with experience with tanks. In late 1920 two or three battalions were to be formed and one of these battalions would be broken up into companies in order to test the infantry cooperation role. The Corps would be officered by volunteers who would then be given a six months course. As to the other ranks, of the 3000 or so presently in the Corps, those who wished to could transfer out and there would be no more enlistments for the time being. Finally it was proposed that an

experimental all arms brigade with air cooperation be formed in 1920.(1) In this scheme, which in fact came to very little, may be seen the germ of future development: first the Corps was formed, then followed a period of experiment both with all tank formations and with infantry support and then the ccnclusions of the experiments were collected and made the basis of formations.

However, by October of 1920 the Army Council was still debating the future of the Corps. At present there were about 400 tanks of various war time designs, Medium Ds had been ordered and it was hoped that they would appear in the spring of 1921. The General Staff called for four different types of tanks: a light infantry tank, a fast cavalry tank, a heavy tank with armour proof against a .5 inch machine gun bullet and an armoured tracked carrier for the 18 pounder gun. The Medium D was approved as the second type and it was thought that a six ton tank with Johnson's suspension system would serve for the first type. Two production programmes were proposed, one to cost 650,000 Pounds in 1921/1922 and producing 161 vehicles and a second to cost 1,300,000 Pounds and producing 287 vehicles. Speaking on behalf of the CIGS (2), the DSD (3) called for the larger programme to be adopted but, after some discussion, the Army Council settled for the smaller.(4) This programme, too, came to nothing because the Johnson designs were not successful. Again, like the other one, this early suggestion contained the germ of future design prior to the rise of the light

tank: the Vickers Medium for the first role, the Medium III in the second, the Independent in the third and the Birch Gun in the last.

The decision that led to the permanent formation of the Tank Corps was made by the Army Council in July 1922 on the basis of the Report of the Peyton Committee.(5) The Army Council decided that a tank corps, separate from the other arms, should be created ending some three and a half years of delay on the matter. The Council accepted all of the Peyton Committee's recommendations except the rather important one that the Corps' establishment should be filled at once and that officers should come partly from the existing strength and partly from elsewhere provided that 40% of the majors and 25% of the captains had had at least six months' tank experience. Instead, the Council decided that some officers would be found from the military academies and the universities but that the rest should await any decision that might follow from the Vesey Committee on establishments.(6)

Fourteen months later, the long awaited moment came. The Tank Corps became permanent on 1 September 1923 and, in recognition of its war time services, was granted the prefix "Royal" by the King. Its total strength was given in the 1923/1924 Estimates as 5,109 officers and men with six armoured car companies in India, detachments in Egypt and on the Rhine and four battalions and a depot battalion at home. Its equipment consisted mostly of the Medium Cs

and some rhomboids and Whippets from war time stocks; most of the armoured cars would have been Rolls-Royce models 1914 or 1920. Major General Sir John Capper, who had had a long association with the Corps, was appointed the first Colonel Commandant. But Sir Hugh Elles, who had led the tanks at Cambrai, was transferred to the infantry and Fuller had earlier been sent to the War Office. These were not to be the last experienced tank men to be transferred out of the Corps. The officer matter had been settled by taking volunteers from other arms as well as those left in the Corps.(7)

November 1918 until September 1923 is almost five years. That seems rather a long time to establish as permanent an organization which had been in existence since 1916. It is not clear why it took so long to establish the Tank Corps especially as the eventual establishment was not greatly different from that proposed in 1919. A possible answer concerns the provision of a suitable tank: after all, there is little point in having a tank corps if no tank can be produced. At the end of the war, it was obvious that the existing mcdels were too slow but the Medium D held out the promise of a fast tank becoming available. The first D was built in 1919 but it was clearly still in the experimental stage and there were many problems connected with it that needed time for their solution. The first Vickers design did not make its appearance until 1921 but it was not satisfactory. By 1922 work on the Johnson tanks was suspended but, shortly

after, the first Vickers Medium was built. At last there was a decent tank and it is surely not a coincidence that, at about the same time, the Army Council decided to proceed with its plans for the Corps. It may, therefore, be argued that the Tank Corps was made permanent just when a suitable tank was built and no sooner.

The establishment of the Royal Tank Corps appeared in some detail in the 1924/1925 Estimates. The strength of the Corps (including India) was given as 5,140 officers and men organized into four tank battalions, nine armoured car companies and a number of training and administrative formations in the Regular Army and eight armoured car companies (cadres for the most part) in the Territorial Army. At home were the tank battalions (except for one company on the Rhine) and two armoured car companies; in India were six armcured car companies and there was also one in Egypt. Next year another two armoured car companies were formed in India and the Workshop Training battalion at home was abolished with a quarter of its engineers "axed".(8) In 1932 was added another battalion and a sixth and seventh appeared in 1937 and 1938; the 1st (Light) Battalion was added in 1933 after some time as an experimental unit. Also in 1933, the armoured car companies began the process of conversion to light tank units. However, in a thesis dealing with tanks before 1934, it is only necessary to remember that there were four battalions - the 2nd, 3rd, 4th and 5th with the 6th added in 1932.(9)

The 1919 scheme had called for an experimental brigade to be formed but nothing was heard of this for some years. In 1926 the 2nd Battalion had exercised with the 2nd Division and had practiced assaults on the infantry at dark or dusk. This test confirmed the enthusiasts in their beliefs and they had found, in this period before anti-tank guns, that the mere threat that tanks might be operating nearby had greatly constrained the freedom of infantry units.(10) It seemed that the time was ready for a full scale test of the powers of tanks against the older arms and in 1921 Worthington-Evans had, somewhat prematurely, announced:

> In the course of the year an experimental brigade will be formed at Aldershot whose duty it will be to discover the best methods of employment of tanks and armoured cars, infantry and aeroplanes in conjunction with each other.(11)

But, because of the general uncertainty and delay already described, very little useful came of this trial.

But the idea of a more comprehensive test was not lost and in 1926 Milne suggested an Experimental Mechanized Force to the Secretary of State for War. At least one tank battalion would be needed and there was one at Perham Down which would have its full complement of 48 fighting tanks by the end of the year. One armoured car company was necessary. In non RTC units, he thought that the one mechanized field brigade which existed and two

other brigades of artillery, some as yet undetermined complement of engineers, some of the 3rd Division's signals and probably three battalions of infantry would be necessary. There should be a reconnaissance unit but, as yet, no vehicles existed for this role; perhaps the force would have to make do with cavalry. For the force many vehicles were required which did not exist and time would be needed to supply them. Time would also be needed because of the way the Estimates were organized: there was no provision for such a force in the 1926/1927 Estimates and, therefore, it would have to await the 1927/1928 Estimates. "It follows that the formation cannot be in full working order until 1928". The Secretary of State for War approved this twelve days later.(12) Now that permission had been obtained, what infantry units could be used? Obviously not those in India, nor those preparing to go to India, nor those just coming back from India, nor those seriously depleted by a major draft of men to India... This problem occupies one file of documents from June until November 1926 and all that has been decided by then was that Milne's original choice of battalion was unsuitable.(13) Eventually, after a lot of prodding from Milne, a suitable battalion was discovered. Then Lindsay, the Inspector of the RTC, took exception to the suggestion that a cavalry unit might have to supply the reconnaissance force. He argued that the Army was already divided into "innumerable small packets" and that a cavalry force would greatly complicate matters. The

Experimental Mechanized Force was bound up with the future organizatien of the Army and it should be "the model, in miniature, of that future Army". (14) As it turned out, Lindsay need not have worried, by the time the Force assembled, the tankette had been invented and there was a machine which could provide the scout force.

Another factor combined with these others to delay the start of the experiment. In May 1926, Fuller was asked by Milne to take charge of the Force. Of course, he agreed. A few days later, he received a letter from the CIGS appointing him to the command of the 7th Infantry Brigade at Tidworth. (15) Naturally in some confusion, Fuller asked for clarification and was told that he could not be appointed on the proper basis of permanence to the command of an experimental force that did not, at the moment, actually exist. Here the matter rested until February 1927 when Fuller arrived at Tidworth where he discovered that he was to command the brigade and garrison in addition to looking after the Experimental Force. This was too much for him and he wrote to Milne saying that these additional duties would prevent him from concentrating fully on the more important issue of the Force. He asked that the garrison duties be given to someone else and that he be allowed a small staff to look after the administrative detail connected with the Force. He received no answer to satisfy him. He then wrote a similiar letter to General Jock Burnett-Stuart under whose overall command the Force would come. This second appeal

was also fruitless. In March Worthington-Evans announced the experiments in the House of Commons:

> In order to gain practical experience of the effect of mechanization on tactics, an experimental force is being formed at Tidworth, composed of completely mechanized units...This force will be placed under the command of an officer who has made a special study of mechanical warfare.(16)

The last sentence quoted, so obviously referring to Fuller himself, prompted him to write to Milne again and again he got no answer that satisfied him. He thereupon wrote out his resignation from the Army. At last he got action. He was persuaded to withdraw the resignation on the grounds that it would be a loss to the Army and with an assurance that Milne was serious about mechanization. Now, for some reason, the offer of the command was withdrawn, Fuller was appointed GSO1 to 2nd Division and the command of the Experimental Mechanized Force was given to one of the brigade commanders of 3rd Division, Colonel Robert J. Collins, a soldier with no tank experience to speak of.(17) It is impossible not to put much of the blame on Fuller for this sorry affair. After thirty years in the Army, he surely knew what to expect and there seems to be no reason why he could not have delegated the responsibility for the 7th Brigade and the Tidworth garrison to his second in command and devoted himself to

the Experimental Force.(18)

This was a most unsatisfactory beginning. The postponements and delays, the difficulty with the command and the fact that it was April suggested that this experiment might go the way of the 1919 one. Liddell Hart, then military correspondent for the Daily Telegraph, had been kept in touch with these developments. On the day after Collins' appointment, he wrote an article which, after detailing these problems, asked whether the scheme had broken down.(19) The article prompted some concern and on 28 April Viscount Sandon asked Worthington-Evans whether there had been any change in the decision to have the Force commanded by an "officer experienced in that sphere". He answered that there had been no such change and that the Force would be placed under Colonel Collins.(20) One hesitates to use strong words but it is difficult to find much truth in this answer. The original announcement had referred to Fuller, and Collins could not be considered under any sense of the words to have made a "special study of mechanical warfare". However, the experiment was not being put off and, on that same day, the War Office announced the composition of the Force.

The Experimental Mechanized Force assembled on Salisbury Plain a short time later in May.(21) Although it was a fully mechanized force with no unmechanized transport, it contained a great variety of machinery. In tanks there were the Vickers Mediums. About 15 tankettes

made their debut and provided the reconnaissance force. In addition, there were the tiny number of Birch Guns which had been built, a number of "dragons" (Vickers Medium chassis used as gun tractors), various types of armoured cars and an assortment of trucks, cars and motor cycles.(22) This disparity in designs resulted in a disparity of speeds for the Force as a whole. The armoured cars had speeds of 35 to 50mph depending on the state of the roads, tankettes, tanks and dragons had road speeds from 10 to 20mph and cross country speeds of 5 to 10mph and the rest could travel at 25 or 30mph. Further, only the tracked vehicles were not roadbound. An orderly solution was found in the Standing Orders which were issued in June. The Force was divided into three groups based on speeds. In the fast group were the armoured cars; their "rate of march" was 25mph and a day's "march" was put at 100 miles. The medium group, at 10mph and 50 miles a day included the infantry battalion, the light artillery battery and the engineers. In the slow group, paced at 7mph and 30 miles a day were all the tracked vehicles.

This division of the Force by speed, suggesting caution and an insistence on orderly movement, was not to the liking of some of the tank enthusiasts. Liddell Hart felt that the Force should move in a series of bounds and believed that the Standing Orders slowed the Force down.(23) Martel, who was commanding the engineer detachment, "said that Collins' early schemes with the

mechanized force seemed to have such narrow ideas".(24) Also current was a gibe that the commanders of the Force were like bankers: they operated on the principle of "no advance without security".(25) It is not easy to assess these charges. One of the problems which had long plagued tank manoeuvres had been the difficulty of communication both within and between tanks. The former problem had, it seemed, been solved with the invention of the laryngaphone but the second was still a difficulty because the radios of the time were so large. It was not until 1931 in fact that it was possible to control large mechanized forces. Coupling the communications problem with the disparities in speed and, especially, the slowness of the tanks which provided most of the "punch" of the Force, it is not so easy to criticize Collins for insisting on orderly movement. The system of movement by bounds might well have resulted in broken down tanks being scattered the length and width of Wiltshire and, in all likelihood, would not have resulted in much of an increase in speed.(26)

The Force spent the first part of its training getting used to manoeuvring together and the scout force under Lieutenant Colonel F.A. Pile demonstrated the speed and dash that the enthusiasts had hoped for.

While the Force was thus preparing itself for the technical details of its function, Milne arrived one day to watch the manoeuvres and deliver a speech to put the

Force into the right frame of mind. To this Liddell Hart had been invited so that the speech could be made known to the public through his newspaper. Milne began by stressing the experimental nature of the Force:

> Now the armoured brigade <his preferred name for the Force> and mechanization generally is not a solution for war... What you worked on this year is only the germ of an idea which wants expanding. I myself, and most of the senior officers of the Army, cannot expect to see a great expansion in our time...

He took as the theme of his speech the text "For if the trumpet give an uncertain sound, who shall prepare himself to the battle?" But it is not clear whether he thought that he was the trumpet blower or the Force was. He continued with a survey of military history and concluded that mechanization offered the only hope for generalship and the possibility of shorter wars in the future: civilization could not survive another long war. He called on the officers to think in wide terms:

> It is the great cavalry raids by people like the Mongols and the Parthians, that want your consideration.

The mobile forces of the future would coexist with the older formations:

> Cavalry, so far as the British Empire is concerned, will still remain an essential.

> It will require bringing up to date with modern arms, mechanizing where possible... You may have armoured cars and tanks with the cavalry but your armoured force is a perfectly separate force consisting of armoured vehicles for definite purposes... It is an armoured force intended for long distance work. It may be essential to employ it as an armoured force for close work, but essentially what I am aiming at is a mobile armoured force that can go long distances and carry out big operations and big turning movements.

He then spoke of the qualities that generals would now need - they must command from the front and be quick witted. The armoured force would be self contained and there were to be no infantry forces in it:

> My idea, however, is that an infantry battalion should not be a definite part of the force but that it should be attached to the force when the commander who is employing it considers that infantry is an essential unit. I would rather that the force remains entirely armoured because there is always a danger if you have infantry with it, that you may get them mixed up in some sort of scrap out of which they may be difficult to

disentangle.

In conclusion he said "It is no longer horsemastership that is required, but the study and care of engines".(27) Apparently, this speech from Britain's senior soldier made a considerable impression on the tank enthusiasts:

> to the happy surprise of the advocates of armoured mobility, <he> not only endorsed their arguments - but expressed these more emphatically than they had dared to hope...(28)

A week later, and thus spiritually fortified, the Force began its large scale manoeuvres. The Force was pitted against most of the 3rd Division and the 2nd Cavalry Brigade. The two opposing forces were placed about 80 miles apart and the cavalry/infantry force was supposed to move 30 miles and it would be seen what the Mechanized Force could do to slow or stop it. From the tank enthusiasts' point of view, the operation was a success. Pile's group got off to an excellent start and moved 40 miles in the first hour capturing the bridgeheads that the enemy needed. It then held the enemy up until the medium tanks arrived at dusk. For administrative reasons, the cavalry/infantry force was allowed to move to Tilshead where it spent the night. The next day it moved a few more miles and was then boxed up tightly by the Mechanized Force and spent the rest of the day completely immobile. At this point the exercise was called off and the cavalry/infantry force was found to have failed to

make its distance.(29)

The reaction to this test will be dealt with below but it would be well to keep a few facts in mind. It is worth remembering that, until 1927, no British troops had ever had to face a real or mock tank attack in any strength. Therefore, it should not be a surprise that the cavalry/infantry force found itself paralyzed. The second point to remember is that the attacked force had very few anti-tank guns. Thus it may truthfully be said that the Mechanized Force's successes were rather one sided. Nonetheless, the enthusiasts' claims had been vindicated in that a not very aggressively handled mechanized force had tied up a considerably larger force and prevented it from fulfilling its mission.

The experiment of 1927 was continued in 1928. The Force (now renamed "Armoured Force") again assembled on Salisbury Plain in the summer of that year. Its composition was much the same as it had been the year before except that there were now more unarmoured six wheeled trucks and half tracks. There were, in fact, 280 vehicles of 15 different types. In July a demonstration was laid on in order to impress the politicians but, judging from Hansard, this attempt at public relations seems to have had little effect. The 1928 exercises were devoted to functional practice and, in addition to much valuable experience gained, the lessons learned were chiefly negative. A practical solution was still lacking

to the problem of controlling such a large force and in making it responsive to the will of its commander. Radio sets were gradually appearing but they were bulky and not very efficient and, in 1928, in no great number. It was learned that the practice of requiring the Force to move in column and in close order caused excessive wear and tear on the tracks and suspension in addition to providing a tempting target to air attack. Much remained to be done and, too often, concentration of force was found to mean congestion and traffic jams. In the final large scale exercise the Armoured Force, in conjunction with a cavalry brigade, was used against the 3rd Division and, again, the more mobile force succeeded in slowing it down and boxing it in.

1928 marked the end of this round of experiment for the Force was disbanded at the end of the year. This news "plunged its officers into the depths of gloom" but they cheered up by thinking that "the alternative project <was> bound to prove a fiasco". (30) Liddell Hart blamed this decision cn Montgomery-Massingberd (at that time GOC Southern Command) (31) and Montgomery-Massingberd gave the impression that it was Milne who disbanded it. (32) In any event, the Secretary of State for War announced that the Force, having fulfilled its experiments, was to be disbanded and the tanks used in forming two new mechanized groups which would continue the experiments in a different direction. (33) This new direction was to be the "stiffening" of two infantry divisions with tank

battalions and experiments were duly carried out in a limited fashion in 1929.

This round of the experiment was now over and what were the conclusions? The three men most directly concerned - Mcntgomery-Massingberd, Burnett-Stuart and Collins - submitted reports. Montgomery-Massingberd stressed what to him was the artificiality of the tests in pitting the Force against the older arms which were denied tank support. He was of the opinion that a combination of armoured cars, light tanks and cavalry would be more useful than the Force as it was constructed because it was so noisy and so sensitive to ground. The Armoured Force could not carry out strategic reconnaissance and the force which would replace the independent cavalry division of 1914 should not be it but a combination of "cavalry, armoured cars, scout cars, light tanks, horse artillery, and mechanized light battalions". The horse was slow but there was no substitute as yet. He wished to see more study of cooperation between tanks and cavalry and infantry because, during the first six months of the next war, the latter would be used.(34) In this last there was nothing unreasonable - Montgomery-Massingberd knew perfectly well that the government would never spend the necessary money on modernizing the Army until forced to it by war or clear threat of war.

Burnett-Stuart began by stating that the exercises had been handicapped by shortages of money and equipment

and by inadequate training and he observed that the Vickers Medium had slowed the Force down. The Force had yet to develop its greatest asset - mobility: "An armoured force is most formidable when it is at large just below the horizon". It was principally a raiding force for it could not hold ground and it was extremely sensitive to ground. Infantry, he observed, was now more confident when it met tanks.

> All this is to the good from an Armoured Force training point of view. There was a distinct danger at first of its having everything too much its own way... Most of the exercises have been deliberately planned to bring out its limitations rather than to make a display of its powers.(35)

It is a good thing that none of the tank publicists got to hear of that for they would have gone even further with their charges of plots. But surely it was just as important to learn the limitations of the tank as it was to learn its powers.

Collins reported in more detail. Speaking in 1927 he said that the Force had been created to test three roles: strategic reconnaissance (possibly to replace the cavalry), cooperation with other forces and "independent operations at a distance". He stressed the Force's vulnerability:

> much of the Force is at present

vulnerable, seriously so in fact, to small arms fire.

This was, he thought, the greatest task in front of the Force: to iron out the various problems. He said that the purpose of the Force was not to hold ground, which he did not believe it could, but to strike the enemy. He was asked about the defence of the Force and replied that he did not want to boast, but in the first week the infantry had escorted the guns but, after two weeks, it had been the other way around.(36) In 1928 he gave his conclusions on the two years' experiments. The following claims could be made: the Force could function on its own in most areas excepting forests, swamps and mountains; its mobility was at least twice that of a normal infantry force and was likely to increase; it had a great moral effect on the infantry and could greatly inhibit its freedom of action. On the other hand, the Force was initially very expensive (although probably cheaper in the long term) and required such a high standard of training that only a long service professional army could handle tanks. The Vickers Medium had limited the mobility of the Force and had added to its grave problem of protection. That problem was likely to get worse as anti-tank guns got better and because up-armouring presented a "prodigious problem". The Armoured Force could not, he thought, carry out all of the functions of cavalry as yet. He urged balance and careful thought for the future because one sided arguments caused military opinion to swing from one extreme to the

other.(37)

Another observer in 1927 stated that, in his opinion, the Force had attempted too much in the first year and that 1928 ought to be spent in "mechanical drill". To him, communication was the greatest problem and was far more important than embarrassing the other arms. The Vickers Medium came in for more abuse as generally being a drag and a limit on the activities of the Force. This writer continued with a number of suggestions two of which were unusual: he wanted three companies of highly trained and lightly equipped riflemen to be permanently attached to the armoured brigade; and he believed that the "real problem" to be solved was the appropriate tactics to be used against a similar force.(38) Neither of those suggestions were common: tank versus tank fights were expressly excluded from official consideration as shall be seen and most thinkers did not wish to see infantry added to mechanized forces except when needed.(39)

Liddell Hart professed himself disappointed with the exercises and again stressed that the units making up the Force should be free to move around and that Egypt was the ideal place for training. Cavalry men should be put in charge of mechanized forces because of their mobile training and their eye for ground.(40) In another article, he called for an increase in light tanks and called for the inclusion of "picked bodies of skirmishers" in place of regular infantry units.(41) Another writer was scornful

of the mobility of the Force: it was so dependent on ground conditions and its average speed at night over unreconnoitred ground was only about 2mph. Mobility must be increased. (42)

A Staff Conference in January 1929 considered all these matters and Collins reported as above: bearing in mind the defects of the medium tank, the Force was capable of the three roles it had been created to test although it could not yet replace cavalry in the scouting role.

So ended the great experiment. It had produced positive conclusions as Collins' reports show and had generally been found valuable. As a result, the probable composition of an armoured brigade would be headquarters and signal section, one medium and two light tank battalions and a close support battery. It was necessary to test the value of light tanks and tankettes in the infantry formations and that was why the Armoured Force had been broken up. But it was hoped that a permanent armoured brigade would be formed in 1930 or 1931. (43)

The Experimental Force had had a mixed reception: it was a good idea, but... It could not hold ground, but that did not matter too much as its role was to hit, not hold. But was it fast enough? The consensus was that it was not although it was a good deal faster than anything else. It was extremely sensitive to ground and its performance varied with the terrain much more than that of a horse or a man. The Vickers Medium was a hindrance and

a liability and the reaction against that tank has been described. Perhaps more important, it was very difficult to control the Force - a small, efficient and reliable radio for tanks did not exist at the time. On the whole however, as a first step, the experiment had been successful - a prototype "armoured" brigade had been put together and had demonstrated that such a formation was a practical proposition. The 1927 and 1928 experiments led directly to the first official statement on mechanization.

Mechanized and Armoured Formations (or the "Purple Primer" as it was nicknamed from the colour of its cover) appeared in 1929. It had been largely written by Broad. It is worth quoting from extensively as it, and its similar successor, was the only statement officially issued by the War Office on the subject and because it was read with interest in other countries.(44) It began with a general introduction which stressed the importance of the Army's being mechanized:

> The Army in its general form must be modelled on civil life and, consequently must mechanize gradually.(45)

Armoured units were to function both as mobile and as combat troops:

> The higher organization of the Army will be as under:-
>
> i Mobile troops
>
> (a) Cavalry divisions or brigades
>
> (b) Light armoured divisions or brigades

ii Combat troops

(a) Divisions with non-divisional troops

(b) Medium armoured brigades. (46)

The characteristics of AFVs are great mobility combined with a considerable degree of invulnerability under fire, together with great fire power in movement. (47)

In open undulating country, tank forces would be very effective but in close country it was infantry that would have the advantage. However, one of the powers of armoured forces would be their ability to prevent infantry unescorted by tanks frcm leaving such close country. (48) It was noted that, because of track problems, tanks were better advised to travel on soft roads than hard and to do long distance moves by rail. (49)

Two proposed formations were set out. The medium armoured brigade would have headquarters and signals, one battalion of medium tanks and two of light tanks, two close support batteries and an anti-aircraft battery with a total of 32 medium tanks, 115 light tanks, 16 signals tanks, 18 close support tanks, 163 other vehicles and 1,871 officers and men. (50) The light armoured brigade would have headquarters and signals, two or three light tank battalions, a close support battery, an anti-aircraft battery and an armoured car regiment to be added as

needed. Vehicles would be (including armoured cars and with two battalions) 111 light tanks, 16 signals tanks, 9 close support tanks, 49 armoured cars, 195 other vehicles and 1,737 personnel.(51) It will be noted that there was a very high proportion of light tanks in the so called "medium" brigade.

In the summer of 1931 appeared Modern Formations, an updated version of the 1929 handbook. This was essentially the earlier book with much of the wording unchanged to which had been added a foreword by Milne, some data on cavalry divisions, a number of references to anti-tank defence and new organization tables.

In his foreword Milne explained the reasoning behind the second book and added a disclaimer:

> In the preparation of the present volume...fuller consideration has been given to the modernization of the older arms as distinguished from the tank arm. The scope of the book is therefore greater than that of Mechanized and Armoured Formations, 1929, which it supersedes.(52)

Though published by command of the Army Council, this pamphlet does not of necessity represent the considered views of that body, but is the result of five years' study and experiment by the general

staff. (53)

The business about the Army's needing to modernize in order to keep up with civilian life was repeated in a somewhat stronger form:

> In view of the trend of modern civilization, mechanization must be accepted as the inevitable stage in the evolution of army organization. Its acceptance or rejection may have seemed at one time to be a matter for choice, but this is no longer the case. (54)

The advantages of the machine in war were outlined:

> It is clear, however, that the machine can carry armour capable of resisting any bullet which can be propelled from a man carried lethal weapon. Further, the machine, while doing this, has a general mobility far in excess of that enjoyed by man, except in certain limited circumstances. (55)

It will be noted that this claim for the protective power of a tank is modest - it is limited to small arms. This edition had good news for the small British Army:

> ...it may be deduced that the modern tendency is for armies to become smaller. (56)

Anti-tank weapons were mentioned and it was stated that "offensive anti-tank action is entirely a matter for fully

armoured units".(57) The section went on to describe the anti-tank weapons available:

> For defensive action, in addition to the artillery, three special types of weapons are available:-
>
> i The anti-tank machine gun
>
> ii The 6-pr. Q.F. gun on pedestal mounting
>
> iii The contact mine.(58)

Again two proposed formations were set out. The mixed tank brigade would have headquarters and signals, three mixed tank battalions, one light tank battalion and a light anti-aircraft section. There would be 63 medium tanks, 131 light tanks, 4 signals tanks, 20 close support tanks, 163 other vehicles and 1,735 officers and men.(59) The light tank brigade had headquarters and signals, three light tank battalions and a light anti-aircraft section with 7 medium tanks, 171 light tanks, 3 signals tanks, 15 close support tanks, 121 other vehicles and 1,267 officers and men.(60)

In comparing the two sets of formations from these two handbooks, several points stand out. The first is the increase in supply of medium tanks in 1931 - nearly doubled in the mixed brigade and an addition of seven to the light brigade. This is surprising when the general dissatisfaction with the Vickers Medium at this time is recalled. However, even in the 1931 mixed brigade - a formation which was to do the heavy fighting - less than

half of the fighting tanks were mediums. Added to which, these were paper formaticns and were a long way from being filled. The medium tank referred to may well be the Sixteen Tonner. The second point of interest is the great reduction in signals tanks in 1931. This reflected the improvement in communications which were to be dramatically demonstrated by Broad in the 1931 manoeuvres. It will also be noted that there was a very high percentage of "tail" to "teeth" in these formations and it was not for some years that Hobart, when Brigade commander, could reduce the ancillary vehicles to more maneagable levels.

In 1930 armoured experimentation took another cautious step forward with the construction of a prototype "armoured brigade" made up of the 3rd and 5th Battalions RTC. These two battalions had formed the RTC portion of the Experimental Forces and, so far as information is available, were organized in the same way as they had been then: that is, about 20 armoured cars and 10 light tanks in the first and about 50 Vickers Mediums in the second. Nothing much of importance was discovered except the usual: the force was reasonably effective against infantry, communication problems were still evident and the speed of the force was not very great. More data on movement was amassed. The longest "march" was 80 miles covered in 17 hours which included a night march of 21 miles. After the first 63 miles, there had been 15 temporary and 2 "workshop casualties" among the medium

tanks. These 17 casualties were put right in about two hours and they rejoined the column.(61) This was not a very good performance: the average speed was a paltry 4.7mph and over the first 75% of the run, 30% of the medium tanks were casualties. It is true that these casualties were temporary but a temporary breakdown has the same effect as a permanent one if it keeps the tank from being where it is needed. A dispassionate observer could have been forgiven for saying that tanks were a long way from demonstrating their "general mobility far in excess of that enjoyed by man".

1931 represents the tank's coming of age in the British Army. In the spring of 1931, Charles Broad left the War Office and Milne asked him to command a tank brigade and see whether he could do what the "Purple Primer" said. Broad decided that the exercises should demonstrate tanks manoeuvring in mass and "no longer single monsters to roam about the battlefield". A Colonel A.C. Fuller, identified by Broad as the "Fuller of the Fullerphone",(62) who was in charge of the Experimental Signals Establishment at Woolwich, had approached Broad in 1930 with a new type of crystal set.(63) Using this device, Broad worked out a series of simple code signals and, at long last, became the first man to control an entire armoured brigade from his command tank.

> Control was complete and I could move the brigade about as I liked.(64)

Before 1931 and Broad's innovations, the "tank idea" was mere theory; after him, it was practical. The difficulty of control had long been realized and there had been a number of articles in the journals which vividly illustrated this fact. In 1922 wireless telephony was possible but impractical - needed for a range of five miles was an aerial of two wires each as long as an armoured car and spaced as far apart as an armoured car.(65) That is to say, signals could be received; there was as yet no practical transmitting aerial for an AFV.(66) Flags were suggested in 1924 (67) and different kinds of shapes to be hcisted from a tank in 1925.(68) An RTC officer recoqnized communication as the greatest problem of tank warfare:

> ...communication, both internal and external, are at present the 'Achilles Heel' of the armoured fighting vehicle.

This was so because there was simply no way of controlling tanks:

> At the moment <March 1928>, control of an armoured force, once it has been launched into action, is practically impossible.(69)

Another author in 1928 pcinted out that writers were fond of comparing an army to a body but that the body's communications were a great deal better than an army's.(70) The extent of the problem may be graphically shown by the fact that the MA set, with a range of 30 to

50 miles weighed 1,594 lbs; the MB set for tanks weighed 234 lbs and, with its ancillary bits and pieces, occupied more than 24 cubic feet; for this it had a range of only 5 to 12 miles.(71) Broad had solved the problem by means of his simple two letter battle code transmitted by flags and by radio signals. Liddell Hart observed 180 tanks moving at speed and executing complicated battle drills to the command of one voice.(72)

The brigade of 1931 was, again, a rather scratch force. Three mixed tank battalions were found and, at virtually the last minute, a light battalion was organized. The brigade had 85 medium tanks and 95 light tanks.

After this experimentation tended to peter out and, according to Broad, "Nothing more really effective was done in the tank line right up to 1939".(73) In 1932 the brigade was again formed this time fortified with 50 additional light tanks and further experiments in control and movement were carried out. Liddell Hart was enthusiastic about the light tanks and stressed their speed; as was by now the custom, he condemned the medium tanks as too old and as ill armoured.(74) Owing to the financial crisis and the May Committee cuts, no brigade scale training was held for the Tank Corps in 1933. At last, in late 1933, the decision was made to establish permanently the 1st Brigade, Royal Tank Corps. The 2nd, 3rd and 5th Battalions and the newly formed 1st (Light)

Battalion were assigned to this formation following the organization set out in Modern Formations, 1931 for a mixed tank brigade.

The question of the composition of armoured or mechanized formations did not attract very much attention in the journals and most of what was written was published at the time of the Experimental Forces. The reason for this limited interest in such an important question is presumably that such a matter could best be settled by experiment. The experiments were duly carried out and most soldiers were content with their conclusion that an armoured brigade was a valuable formation. Therefore, there was little cause to write articles calling for all armoured formations.

A few articles were written however. In his Gold Medal Essay for 1919, Fuller had proposed a "new model army" and he believed that such a thing could become a reality in ten years. This army was to be made of divisions of 12 battalions of infantry, tanks and machine gun companies combined together; in each division there would be in addition artillery, cavalry (two regiments) and tank battalions. The British Army could be organized into eight of these new divisions with another 12 brigades in the Dominions (of which half were to come from Canada - a most unrealistic assumption).(75) Two things will be noted in this proposal of the new army of 1929: the basic unit was to have been an all arms formation both in the

battalions and in the divisions (something which Fuller apparently later changed his mind on) and Fuller had included cavalry in his model army. In another article in 1924 Fuller set up a future battle. In this article he was mainly arguing for the utility of tanks but he had the army with its tanks organized independently defeat the army with its tanks organized as infantry support (so much for the all arms units of 1919).(76) Another article protested against the "awful mathematical allotment" of one tank battalion for each division and argued for an independent tank force.(77) A paper written by Lindsay in 1924 and published in late 1927 argued for the formation of an experimental mechanized force but, of course, by then events had passed the article by.(78) Two other articles in 1928 proposed armoured brigades (79) and Burnett-Stuart called for a mechanized force properly organized although he admitted that financial problems would make this difficult.(80) The last article written on this subject during the period suggested a new army organization. There should be a mobile division of light tanks and cavalry, one motorized infantry division and two regular divisions and, in the corps and army troops, two medium tank battalions.(81)

As the above demonstrates, there was little debate in the journals and there was little reason: there was an experimental force and it led to the formation of an armoured brigade which, with the probable addition of cavalry, would have served as the mobile force of any

Expeditionary Force organized for a major war before 1933. There was nothing to debate about; experiment was proceeding slowly but regularily.

The question of future tank formations had not been settled by 1933: experiments would continue up to the beginning of the war. What had been decided by 1933 was modest. A mechanized force had been tried and been found to be valuable. This had led to further experiments with tank brigades. The brigade had been found valuable as well and one had been permanently established and a tentative organization had been worked out. There was a tendency towards not including infantry in such formations on the principle that infantry could be added when needed and, when not needed, was a hindrance to such a force. By 1933 much of the problem of communication had been solved internally by the laryngaphone and externally by the provision cf an increased number of radios and new developments in the state of the art. Light tanks were being added to the RTC and the critical equipment shortages were becoming less critical. Regular progress had been made and the RTC was daily becoming more proficient at working out the detailed problems of gunnery, drill, maintenance and so forth for which there were no ready made solutions. The British were later to regret their insistence on all tank formations but in 1933 they were well enough satisfied with progress in organization and formations.

CHAPTER SIX

Strategy and Tactics for Armoured Forces

In the early postwar years there was a good deal of uncertainty about the future organization and purpose of the British Army. Thinking on this subject began before the war ended and, in April 1917 the Army Council created a committee to consider the future size and composition of the Army

> on the assumption that at the conclusion of peace, and for the first few years afterwards, the size, composition and distribution of the Regular Army, speaking generally, may have to be the same as before the war. (1)

In 1920 Churchill praised the pre-war arrangements and stated that their excellence was proved by the fact that the Army was returning to them. (2) Later in that year it was pointed out that many army units were confused about the future and did not know what stores they were to keep up. (3) Much of the confusion was caused by the matters of economy, the adoption of the ten year rule, the large scale of post war responsibilities and the uncertainties over the future of mechanization which have been mentioned. But there was another problem: the 1914

Army had had an enemy against which to measure itself but by 1919 Germany was a negligible factor and where was there a likely or even possible enemy? This matter came up in the CID in 1920. There discussing naval matters, Lloyd George pointed out that there were only two major naval powers remaining besides Britain: the USA and Japan, - and that Britain was on friendly terms with both of them. While the possibility of future hostility of these powers towards Britain or each other must be kept in mind, Britain could not compete against the USA in naval construction. The solution, he thought, was that each power should build for supremacy in "its sea". (4) Hankey, always influential on such matters, suggested to the Foreign Secretary that the political assumption for defence planning should assume a war with Japan or one with France. He did not think that either situation was likely but "They provided the best criterion by which to measure our defensive arrangements". (5)

In the years before the appearance of more likely enemies, the CID discussed various powers as possible enemies. Hankey's rule seems to have been followed and these countries were taken not as genuinely potential enemies but as convenient standards against which the British defences could be tested.

> In 1921 A.J. Balfour was of the opinion
> that the danger cf an air attack by France
> constituted a grave menace to the country

but Churchill more realistically stated that such a war was "at the present time, practically inconceivable." (6) The CIGS shared this latter opinion. (7) The alleged air menace from France was to crop up from time to time in the 1920's but no one, with the possible exception of the RAF which found the French air force a convenient measure, took it very seriously. It came up again in 1922 and it was said that Britain could be rendered "almost impotent" by "a continuous stream of aeroplanes from France dropping bombs by day and night"; this was, however, unlikely. (8) In 1923 it was estimated that the "continuous stream" (presumably immune to any and all defensive action or mechanical breakdowns) could drop 168 tons of bombs on the first day, 126 tons the next and 84 tons a day thereafter on Britain. Again it was stressed that France had been chosen not because of fears of a war with her but "because at the present time she is the strongest air power". (9) From this time on, the French "air menace" virtually disappeared from serious consideration.

If France was not to be taken seriously as a possible enemy, some thought that the Soviet Union should be. In 1926 the Foreign Secretary deprecated the idea that Japan should be considered an enemy and continued:

> I have no hesitation in stating that our policy should be based upon the assumption that Russia is the enemy and not Japan. (10)

A Russian descent on India was an old British fear and was

repeated in a paper written by the General Staff in 1927. (11) Regardless of whether such a fear had been justified in the nineteenth century, the new Soviet government was ccncerned at that time with its internal problems and had no desire for such a large foreign adventure. Because of a complete lack of evidence of Soviet desires for conquest in India, the fear of Soviet attack does not figure much in British sources apart from these two references.

If not France or the Soviet Union, then perhaps Japan should be considered to be the enemy. Certainly, the minutes of the CID show considerable discussion of the situation in the Far East but was there anything to suggest that Japan might fight Britain one day? Most people thought not. In 1925 Chamberlain could not "conceive of any circumstances" in which the two countries might singlehandedly fight and saw the only possibility of war as following from a major redistribution of European power - for example a German-Soviet-Japanese agreement - which he thought unlikely. (12) As has been mentioned, he repeated his conviction that Japan was not the enemy the next year. There was some concern that the cessation of the Anglo-Japanese treaty might cause friction but, in 1930, relations between the two countries were still considered "excellent". However, by 1932, relations had worsened and the ten year rule was finally cancelled because "Recent events in the Far East are ominous". (13) Next year Montgomery-Massingberd objected to the inclusion of France in the COS report because

> it may divert the attention of the CID from what are much more real dangers, Germany in the west and Japan in the east. The latter is a possible enemy. (14)

A memorandum from Milne in 1930 marks the last confidence in the 1920's spirit. He felt that war was unlikely either with Germany, Italy or Japan although (on no evidence submitted) he remained suspicious of Soviet intentions. (15) The near future seemed secure from major war.

A revisionist Germany was a more likely enemy than either France or the Soviet Union and the General Staff had been keeping abreast of developments there. In 1921 it was estimated that the Germans could put ten divisions into the field but since France, Poland and Czechoslovakia could produce 105, a threat from Germany was not to be taken too seriously yet. (16) It was evident that Germany was evading the military provisions of the Treaty and this was known to the General Staff not later than 1928. It was estimated that Germany had a strength of about 2,000,000 men fully or partially trained and it was clear from the sums allocated to the army that she was building up a war chest. This was a conservative estimate but it was certain that Germany was "building up reserves for future use". On hearing this, Churchill said that he thought there was little danger so long as the French Army remained strong and he said that the British should not

oppose French Army size.(17) In 1930 Milne warned that Germany was undoubtedly evading the provisions of the Treaty of Versailles

> not only as regards the provision of trained reserves, but also as regards the use of forbidden weapons and the provision of illegal war material.

The General Staff had probably been reformed and much assistance was being given to "patriotic" organizations. He felt that the German Army was not at present a threat to peace but that it was being made as large and as efficient as possible and that the military spirit was being kept alive. MacDonald agreed with this assessment and suggested that, in the event of a breakdown in the disarmament negotiations, Germany might claim the right to rearm. (18) Next year another General Staff officer warned

> To sum up: leaving Russia as a colossal and unsolved problem on one side for the moment, the main problem of future European peace is bound up with the future of Germany...should, however, as is more probable, a more violent and determined element seize the reins of government, it is difficult to see how, sooner or later, war can be avoided unless France is prepared to knuckle under completely <and such a course is unlikely>...(19)

These assessments were, of course, perfectly accurate and the possibility of war with Germany grew year by year.

We have now looked briefly at the candidates for the position of enemy-in-chief and have seen that throughout the 1920's there was no convincing enemy. However, by 1931 or 1932 Japan presented itself and it was soon followed by Germany. Where was the British Army in all this? It is evident that a war with Japan would be principally a naval war which would not require much of an army but that a continental war with Germany probably would. The purpose of the British Army at home was defined in 1931 in an addition to Army Training Memorandum 4A :

> An overseas major expedition is the problem for which the army at home is directly organized. This is the 'average condition' quoted in FSR, Vol. I, 1930, Ch. 1, Sec. 1, Para. 3."

Confusion arose over this point more than over anything else and it was often said that such an enemy must be as modern and as good as the British Army. But that was not true and a hypothetical enemy army of that calibre was described. The description is of an army of twelve battalions, six cavalry regiments, 36 tanks and six armoured cars including supporting units. The "national war" (ie a very large scale war) was remote and "in the background". Such a war would likely be fought by "new armies" like those of 1916. (20) This terminology was

derived from a pair of definitions which had been developed in 1923. A "small war" was one which could be dealt with on the voluntary principle by a force of 12 infantry and one cavalry divisions; a "great war" would require the full resources of the nation. (21)

The future employment of the Army could not be safely predicted:

> unlike the armies of other military powers, the British Army at home has no single predominant objective towards which its training can be categorically directed.

In order of probability, the tasks of the Army at home were: imperial policing, minor expeditions, and, a very distant possibility, the national or great war. Preparation of bodies of troops for the last would be "premature" but officers would be allowed to study the possibility. (22)

The fact is that, between 1919 and 1933, what with financial problems, the ten year rule, the strategic situation and the general lack of interest in the country, the British Army did not develop a comprehensive policy. General Sir Edmund Ironside was one of the inheritors of the drift of the time and this is what he had to say:

> As we stood at the end of 1937 we had no such Doctrine <i.e. as that which the BEF of 1914 had had>. We had no plan even for

the assembling of an army to go to France in case of war with Germany.

The maddest thing of all was that the RAF had carved out for itself a special character. They made no effort to join in any war doctrine, much less a doctrine in tactics with either Army or Navy.

I thought it a most dangerous situation . (23)

There was plenty of time in the future and, in any case, the ten year rule inhibited the sort of preparations that were to be so lacking when the war came.

Whatever would be the employment of the Expeditionary Force, it was planned that the RTC would take part. In 1923 it was laid down that the first contingent, to take the field immediately, would be three infantry and one cavalry divisions, ancillary troops and three tank battalions, two armoured car companies and a tank salvage company. Four months later another two divisions and two more tank battalions and another tank salvage company would be available. In the final organization given, it is clear that each tank battalion was to be attached to an infantry division and the armoured cars would be in the cavalry division. A note reminded readers that the tanks might not be available for some time. (24) In 1924 the structure was substantially the same. Another note stated that there were only two tank battalions available and that the remainder of the paper formations would not be

available for some time. (25) This organization lasted until 1930 when it was modified in a number of important ways. The first ccntingent, to arrive "x" weeks after mobilization, would only be a partial cavalry division and an infantry division with its attached medium tank battalion. The force would be fully assembled at "x + 6 months" and would again be five infantry divisions, five tank battalions, one cavalry division and supporting troops. As may be seen, since 1923 the initial contingent had shrunk and would take longer to arrive. Among the supporting troops was to be the Armoured Force "if formed". (26) Not only was this a slower mobilization, but, with only four tank battalions not at full strength, there were not nearly encugh tanks to form five battalions and an armoured force. By 1932 the armoured force had still not been formed and there were complaints that there was not even a paper formation from which a start in planning could be made. (27) The Expeditionary Force outlined in 1930 lasted with periodic updating for the rest of the period; it is of interest to note that by 1933 "x" had still not been defined. Therefore, not only was there no such doctrine as had existed in 1914, but there was no such BEF. The trained and equipped six division force which mobilized in 1914 had been replaced by 1933 by a partly worked out paper force lacking much of its equipment.

We cannot escape the conclusion that, so far as the Army was concerned at least, Ironside's comments were

accurate. There was almost no planning for the Army and such planning as there was was quite unrealistic. The mobilization plans dealt with non-existent units equipped with non-existent equipment assembling some time in the vague future. No mention or thought was given to what would happen during the "x + 6 months" that the five divisions were being created. The British shyed away from any thought of a "continental commitment" and dismissed such problems as being in the class of the "great war" for which there would presumably be enough time to create the "new armies". In 1915 France had held the line while the British created their armies; who would hold the line in the future war? The British could not assemble fast enough to prevent the "minor war" from turning into a "great war" or a defeat and there was no planning whatsoever for the "great war". In this atmosphere of hope and procrastination, it is not surprising to find that there was no discussion on the official level on the strategic uses and implications of tanks.

Indeed, in the discussions of Imperial strategy and defence which occurred between 1919 and 1933, tanks and mechanization are virtually never mentioned. There are no references at all to "tanks", "armour" or "mechanization" in the Cabinet minutes. (28) Neither is there anything directly relating to these matters in the minutes of the Committee of Imperial Defence. (29) There is one reference only, and an unimportant one, in the minutes of the Chiefs of Staff Subcommittee.(30) A perusal of the CID

minutes shows that the principal concerns of defence planners were air defence and the Far East.

Tanks figured not at all. Only the Army Council had anything to to do with tanks and, even there, there are more references in the index to details of uniform design than to tanks! This lack of consideration of such a revolutionary weapon displays, to say the least, a deficiency of imagination among the senior officers. As the tank propagandists correctly perceived, the invention of the tank had qualitatively changed the nature of war and changed it in a way that all powers must adapt to. Great concern and thought was expressed over the implications of the aeroplane in war but, when it came to tanks, such an appreciation was missing. Not all the lack of interest was a result of conservatism however. Tanks were experimental and very little was known about them; furthermore, the relatively fast post war tanks were so qualitatively different from the war time rhomboids that, clearly, much time and experiment was necessary. It was not clear at all what the future of the tank would bring. Therefore, it may well be that the reason that there was so little consideration of tanks in these committees was that everything depended upon the results of experiments and, until those experiments were concluded, there was little to be gained frcm speculation about the strategic import of tanks. As has been shown in the preceding pages, there were sound reasons for doubting the potential of tanks: they might never be mechanically sound, or they

might be so vulnerable to anti-tank defences so as to be virtually useless; only experiment over a long time could tell.

If there was no official strategic thought or conclusion about tanks, there were at least semi-official conclusions about tanks in a tactical sense. Reference has been made to the "Purple Primers" and in them some tentative remarks were essayed about tanks in a tactical context. First, the two kinds of tanks were defined in their purposes:

> The medium tank is at present the most powerful AFV in the service.
> Its main role in battle is to destroy the enemy by fire or shock action.
> The tank is, therefore, designed as a gun platform for the delivery of fire on the move...
> Definite periods each day are required for maintenance and repair - these periods will become more prolonged as operations continue. (31)

> <As to the light tank> Speed is, however, of more general importance than fire power, as the finding of the enemy or the anti-tank device is the first function required from this machine, neutralization by fire being the second. (32)

The above two sections were repeated verbatim in Modern Formations and the role cf the light tank was expanded:

> Light tanks are to be used to reconnoitre for, and co-operate with, medium tanks, to co-operate with armoured cars, cavalry and infantry, and for other tasks mentioned in Section 15. (33)

Section 15 gives:

> i Close co-operation with medium tanks
>
> ii Reconnaissance for the operations of tank brigades
>
> iii Light fighting in general in co-operation with armoured cars, aeroplanes, cavalry and infantry
>
> iv Operations within the division either in a protective or reconnoitering role; especially with bus columns. (34)

The objectives of the armoured brigade were set out:

> objectives suitable for an armoured briqade acting independently are as follows:-
>
> i. Hostile cavalry formations
>
> ii. Hostile infantry formations
>
> iii. Posts on the lines of communications
>
> etc
>
> iv. Hostile armcured formations.
>
> Such formations <ie hostile armoured formations> do nct, however, exist at the

> moment, and as the subject is therefore purely theoretical, it will not be further discussed on these pages.

This section, with its very important last sentence, was quoted verbatim by the later publication.(35)

This small number of statements represents the sum total of official or semi-official pronouncements on the tactical role of tanks in the period under consideration. It is not very much. Therefore, in conclusion, from the official side, there was no consideration at all of the strategic role of tanks and very little of the tactical side. All that may be said in mitigation of this lack is that experiment had not yet resulted in sufficiently firm conclusions by 1933 for the role of tanks to be adequately taken into account in planning.

Turning to the military journals of the period, we find that this indifference to the strategic possibilities of tanks was not wholly shared. Fuller, in particular, in a series of articles outlined the effect that the tank would have on the future. However, we find here again that the pattern noticed in other places was repeated: an early overconfidence in the powers of tanks gives place to doubts and criticisms of the extreme positions taken by the tank propagandists after 1929. The propagandists did not change their opinions but the early confident articles were replaced by the more sceptical efforts of others.

In Chapter 2 the arguments for tanks were outlined and many of these have a bearing on the strategic uses of tanks. It was shown that it was generally accepted that tanks, in principle at least, promised economies in men, effort and money and that they were more effective than anything else, so much so, that one day tanks might replace all the other arms.

In these arguments and in their application to strategic thinking, Fuller was preeminent. In 1919 he argued that tanks could replace most of the other arms and could, by virtue of their effectiveness and economy, fulfil most battlefield missions.(36) He returned to this theme in 1921 and prophesied a future war in which floating tanks would be landed from ships and moving straight inland at a speed of 10mph would be, in 24 hours, 150 miles inside enemy territory. While this force was raiding like "Vikings" a determined mechanized invasion would be landed elsewhere. Tanks would unite the three services - floating tanks would link the Navy to the Army and the ground gaining potential of tanks would free the Air Force from the necessity to return home to its bases. A mechanized army would be more effective than an army based on "muscle power" and, therefore, could result in savings.(37) This article represents the clearest and most confident statement of the "tank philosophy" and the changes in strategy and tactics made possible by the invention of tanks and other AFVs. Next year Fuller surveyed the history of transportation and observed that

armies were hindered by the fact that they could move in two dimensions but that their supplies could move in one dimension only (ie along roads or railways and not in any direction overland). Tracked vehicles would enable the two dimensional movement of supplies and fundamentally change the nature of war. Gone would be the days of the slow buildup and future armies would be able to organize for immediate and decisive battle.(38) In another article that year replying to the belief that future wars would be entirely decided in the air, he observed that aircraft had to land and that the tank because of its qualities would be of great value in capturing airfields.(39) In 1924 he posited an imaginary future battle in which the issue was entirely decided by the activities of the opposing tank forces with the cavalry and infantry looking on in a passive role.(40)

After 1925 Fuller became silent in the journals - of the 16 of his articles considered, no less than 14 were written before 1925. He was by far the most imaginative of the tank writers and his writings had all the advantages and the defects of an active imagination. Nowhere did he consider the effects of anti-tank defence and, as in his article suggesting the "Viking" force, there is a lack of a realization of the possibility that the enemy might also have tanks. This confidence that Britain had some sort of monopoly on tank expertise was to be later criticised. It was all very well for Fuller to talk about fast forces of tanks doing what they pleased

but the uninspiring performance of the Vickers Medium brought one down to earth with a bump.

The first sceptical article on the strategic role appeared in 1929. A future British Expeditionary Force would, it was said, prcbably be outnumbered by other nations' even if both were mechanized. The reason was (quite correctly as we have seen) that the other nations would say "if we mechanize, for the same money we can get more power" whereas the British would say "if we mechanize, we can save money".(41) This was a fair comment and exactly summed up the early discussions on the economic advantages of tanks. Germains had much to say. He observed that, in British training, the tank vs infantry battle had been taken almost exclusively as the paradiqm, but, he said, it was much more likely that tanks would find themselves fighting other tanks. In any event, there was nothing that the British could do in terms of mechanization or anything else that would enable their army to stand up against a non-mechanized continental army ten times their size. There was no reason to suppose that other countries could not match British science with their own science.(42) In another article he examined three of the extreme claims. Could machines replace men? He thought not, that had not happened in naval history and there was nothing to suggest that it would in the Army. He did not believe that the strength of nations would be measured by the size of their tank fleets because he could not bring himself to believe that the tank had much

utility. The notion that only long service armies could handle tanks he dismissed: knowing that he could assume strong infantry and artillery forces, a continental designer could modify designs; for example, knowing that he could rely on his own artillery for protection against the enemy artillery, he could dispense with speed in a tank in return for gun power and armour. Germains did not believe that tanks had reduced the value of infantry; after all, infantry could operate under all conditions whereas the tank had certain limitations.

> It is impossible to lay down hard and fast rules. Under certain conditions a tank attack may be decisive; under other conditicns it may be a disastrous failure, and an infantry attack should have had greater prospects.(43)

While he did not think that the tank was useless, Germains did not believe that it could do everything alone. One reason why some claimed that the tank could do everything by itself was that in the exercises of the time tanks seldom fought cther tanks. As has been mentioned, the "Purple Primer" dismissed tank-tank battles from consideration. This airy dismissal was not to everyone's liking:

> The tendency to assume that all the strategy, all the 'mechanical mindedness' and every new conception of the Art of War are going to be found on one side alone,

> sooner or later must lead to a disastrous disillusionment. (44)

And so it did.

As regards the tactical employment of tanks in future, the journals of the period provided a number of suggestions and arguments. One of the earliest of these, and in some respects the model for subsequent discussions of tank tactics, was Fuller's "Plan 1919". Conceived by Fuller when he was Staff Officer to the Tank Corps in 1918, the plan was for a decisive battle on the Western Front in 1919 which would lead to victory. After a short introduction describing the effect that the tank would have on mobility, security and offensive power, Fuller posited that the only way to win the war was to strike at the enemy's "brain" - his headquarters. After this "shot in the brain", he proposed a "shot in the stomach" - an attack on his bases. The enemy "body" would thereupon starve to death in disorganization and victory would be won. The Medium D was to be the means of victory thanks to its speed and radius of mobility. After the enemy's reserves had been attracted to a carefully chosen sector of the front, a force of thousands of Medium Ds, motorized infantry and marauding aircraft would smash through the line and make straight at the enemy's army headquarters. Bombers would attack his supply depots but his signals would be left alone so that bad news and rumour could circulate freely to the troops at the front. After sufficient time had been allowed for confusion and

demoralization to set in, the line would be assaulted by a force of Mark VIII tanks, medium tanks and infantry. This force, he estimated, would require 12,000 tanks and 240,000 men.(45) Here was the essence of the tank battle: high mobility, brain warfare and deep penetration. The enemy's morale would be sapped before the attack and the attack would go all the more easily for it. During the whole of the battle, the enemy would be trying to hold the line with the knowledge that, behind the front line soldiers, there were thousands of tanks destroying their supplies, their lines of retreat and their command structures. In this brilliant plan were the seeds of the blitzkrieg of 1940.

Speculative articles of prophetic plans were one thing but tank tactics were a matter to be settled by trial and error. Experiment did not end in 1933 and therefore, no definite conclusions can be drawn about the prevailing point of view in the period. Generally it was accepted that, in a future war, tanks and other armoured vehicles would form the strike force of the British Army. Exactly in what way, if at all, tanks would co-operate with the other arms, or how they would be organized within their formations or their actions when attacking, defending or fighting other tanks had not been decided. Most people seem to have assumed that light tanks would lead the attack with the mediums with their superior gun power bringing up the rear in case the light tank spearhead ran into trouble. Farther than this, it seems,

no one, in the absence of data gathered from manoeuvres, was prepared to go.

There were opinions however. We have seen earlier in the section dealing with the anti-tank controversy that many thinkers assumed that the best defence against a tank was another tank. This was questioned by a tank officer. He did not think that there would ever be enough tanks to provide both the strike force and an anti-tank force. In any event, enemy tanks would likely attack friendly infantry and defending tanks would be faced with the possibility of harming their own infantry more than they helped. For these reasons he foresaw tanks being kept back to attack infantry and rarely if ever fighting other tanks.(46) This writer returned to the subject again in 1925: "the normal employment of tanks is when infantry themselves cannot get on..." And "there will seldom be a tank battle, because the attacker, if he knows his job, will always have the greater strength of tanks."(47) This writer saw tanks as being sparingly used and always to be directed against the infantry, assumed to be helpless in those days before anti-tank opinion changed. There is, of course, a flaw in this thinking - if tanks were so effective and infantry so helpless, a commander could not risk losing all his infantry to the enemy tanks and would therefore oppose the enemy tanks with the only force which was capable of dealing with them - his own tank force. This was seen by Pile when he suggested that, far from these pictures of the tank forces ignoring each other in

order to cut up the helpless infantry, the opposing tank forces would go for each other and the resulting tank battles would quickly exhaust both side's tank forces.(48) In many respects, what Pile was saying was that tanks were mainly useful because they could cancel out the effects of the enemy's tank forces.

More space was devoted to the role of the light tank than to the tactical role of tanks generally. Liddell Hart suggested in 1927 that the tankettes lead the attack and "smother" the defence with machine gun fire. Only if they were held up, would it be necessary to call up the medium and close support tanks.(49) Martel advocated an entire army in tankettes and stated that such a fully mechanized force would be far more effective than a conventional four division force. Again, the light vehicles would do most of the work with fire support from the heavier machines.(50) This tactical construction was supported by another officer the same year.(51) In 1928 a tactical formation was suggested which had armoured cars forming the outer perimeter, inside was another perimeter of light tanks and, in the middle, ready if required, were the medium tanks and self-propelled guns. The roles of the light tank were given as reconnaissance and protection. It is not clear whether this officer believed that the light tanks should do most of the fighting but his formation suggests that they would and that, again, the medium tanks would function as an emergency reserve. Of interest in this article is one of the rare calls for

practice with armoured melees so that tank forces would qain valuable practice instead of more or less effortlessly shooting up infantry columns.(52)

Such a warning was necessary because of the (misplaced and groundless) confidence that the RTC would never have to fight other tanks. Indeed, the whole growing emphasis on the light tank from 1927/1928 onwards was a product of this Panglossian attitude. What would happen to the light tanks if they ran into real tanks? Fast though they may have been and small though they may have been, their armour was so weak that real tanks would have easily destroyed them. And the machine guns of the light tanks would have been no use against tanks. The whole concept of a tank armed with nothing more than a machine gun assumes that it will never have any other target than infantry. As it happened, the British light tanks were not fast enough and they were not small enough and they were shot to pieces by the German tanks.

Tactical doctrine had to await practical experiment.(53) The Experimental Forces of 1927 and 1928 provided a great mass of practical experiment. The lessons were summarized by Brig. Collins in a series of articles written to inform the Army about the lessons of the forces. The conclusions of the two years' experiments were that, although subject to the expected "teething troubles", such a force could operate on its own in most kinds of terrain with the exception of forests, swamps and

mountains. Its mobility and endurance were much greater than those of a normal infantry force and likely to increase. In almost every way a mechanized force was superior to a normal infantry force - it possessed a great moral effect, it could so inhibit the infantry so as to render it virtually immobile, it was less vulnerable to air attack and so on. He felt that the mechanized force, at least at that time, had some drawbacks in the tactical sense. It was "peculiarly sensitive to ground", and he did not think that it could replace cavalry in all functions as yet. As anti-tank weapons improved, tank attacks were likely to become more costly. Nonetheless, tactically the armoured force was capable of what the tank pioneers had been claiming - it could move long distances and deliver a powerful blow and it was most useful in supporting and co-operating with other arms.(54) In another article, he stressed that much of the force had been vulnerable to small arms fire and that this problem had to be solved soon. When asked whether the force could hold the ground that it had taken, he replied that it could not but that that was not its business - its role was to strike hard at the enemy.(55) He did not go into tactical detail in these articles because the situation was still very much experimental.

In 1932 an anonymous author summed up the indecision by stating the possibilities. Tanks could attack in First World War style, in support of infantry against prepared positions; they could attack a small objective at right

angles to the main infantry attack; or they could be used in far ranging attacks to the enemy's rear or flank.(56) Tactics were still fluid and the future activities of tanks depended on what the next war would turn out to be like.

Therefore, as the period drew to a close, there were no formal doctrines on the uses of tanks and armoured forces either strategically or tactically. Experiment continued, and just as new formations and combinations of light and medium tanks were tried out in the summer and autumn manoeuvres, so new tactical ideas were experimented with. However, there were visible by 1933 the beginnings of firm conclusions. Although it was seldom clearly stated, it was usually assumed that tanks would be used only against first class enemies; for the normal run of police work in the Empire, armoured cars were more use. An underlying assumption, that was not often made clear, was that tanks would find themselves attacking infantry most of the time - so presumably, it was assumed that the enemy would not have very many tanks. Present was a very strongly held belief that, having taken and held the lead in armoured development, Britain could continue to enjoy this superiority. The strategic role of armoured forces would probably be, once the details had been worked out and the obsolete medium tanks replaced, that of the cavalry in its great days - the infantry would fix the enemy and the armour would hit him, break him up and pursue the remnants. Tactically the rise of the light

tank has been noted. Beginning as a cheap tank, the tankettes and later light tanks rapidly came to inherit a number of other developments which stressed mobility and smallness of size. Beginning as an auxilliary to the main force of medium tanks, the light tank in the British Army was, by 1933, moving to the pre-eminent position on the battlefield. Future battle, it was believed by many, would be principally carried out by light tanks appearing and disappearing on the field, blanketting enemy positions with a "cone" of machine gun fire, attacking infantry and disappearing suddenly after sowing death and panic. Armoured forces would be preceded by swarms of light tanks, penetrating weak positions and bypassing strong ones. Medium tanks were becoming relegated to the role of self-propelled artillery - ironic in view of their weak armament.

There is an air of unreality in this picture of the enemy infantry digging in and wiring their positions as if they were back on the Somme and the time was 1916. In little of the writings of the tank propagandists of the time was there much appreciation of the problems of tank battles. Indeed, a number of articles (57) speak of light tanks armed with .5 inch machine guns functioning as tank destroyers: that thinking assumed that the enemy would have the same under armoured vehicles as the British. Experience in the next war would change many of the ideas of the Royal Armoured Corps. The legacy of British tactical thinking and the resulting designs was to become

apparent in the war with the adoption of many American tank designs. (58)

CHAPTER SEVEN

The Cavalry and the Tank Controversy

An excellent introduction to the cavalry question between the wars is provided by the debates in the House of Commons in 1921. In two debates, the first on the Army Estimates in March and the second on the cavalry itself in April, are found the principal arguments, good and bad, for and against the retention of horsed cavalry in the British Army.

Worthington-Evans opened the Army Estimates debate by referring to a "fast moving, powerful tank which would be more effective than the cavalry".(1) That statement expressed the view of many that the tanks could replace the cavalry. This was riposted by Major General Seely who as commander of the Canadian Cavalry Brigade had had war time experience of one of the more effective cavalry units on the Western Front:

> ...I believe that the Right Honourable Gentleman and his advisors are entirely wrong in thinking that they can substitute tanks for cavalry... That seems to me to be a most extraordinary misreading of the lessons of the War... Every advance in science has made the horse a more and more

indispensable weapon of war.

Cavalry, he continued, were essential in the provision of speedy reconnaissance and had proved its value in the battle of the Marne and again in Palestine.(2) Seely was denying that the cavalry could be replaced by the, at that time, slower and noisier tank for certain purposes. Not only had cavalry proved essential in the last war, declared another Member, but "cavalry training is probably the most successful of any branch" in encouraging quickness of reaction.(3) These statements affirming the value of cavalry were answered by counter claims and another Member denied that cavalry could have any use in war - machine guns had slaughtered cavalry in the past and they would do so in the future.(4) Another speaker admitted that cavalry could not play much of a role in Europe but argued that it had considerable utility in Asia.(5)

In April the cavalry supporters in the House returned to the attack with the proposal of a motion which read:

> That, in the opinion of this House, the proposal to reduce the mobile forces of the Crown, and especially the disbandment of four British cavalry regiments, is contrary to the experience gained in the late War and inimical to the best interests of the defence of the Empire.(6)

The seconder of the motion argued that tanks were essential in some areas but that there were types of

terrain in which they could not operate; for movement in these areas, cavalry remained essential.(7) Another speaker questioned the utility of tanks - "a well placed mine or field gun would quickly place a tank out of action".(8) Another speaker drew the attention of the House to the excellence of cavalry training: of the eight Field Marshalls then alive, no less than four were cavalry men.(9) It may have been true that cavalry were not much needed in the last war, argued another, but the next war might duplicate the ccnditions of South Africa or Egypt "where tanks could not be used".(10) Other speakers attacked the cavalry and declared that it had been no use and never would be again:

> ...I can honestly say that if the war on the Western Front proved anything it demonstrated beyond all doubt the utter futility of cavalry being employed in modern warfare.(11)

Worthington-Evans defended the Government's actions. It was nonsense to talk of a reduction of the mobile forces of the Empire for the four regiments would be replaced with four battalions of tanks. In any case, the Government did not contemplate abolishing the cavalry altogether. When the motion was voted upon, it was defeated 143 to 34, 24 Army officers voted with the "Ayes" and 25 with the "Noes".(12) the debate was not important and, as the voting tally shows, the Government was never in any danger; nor does the fact that only 177 MPs took

the trouble to vote on the matter suggest that it was held in much interest.

But the debates are interesting to us for in them were given all the reasons for retaining cavalry and all for abolishing it. It was suggested that cavalry should be got rid of because it was completely obsolete both now and in the future and the tank could perform every one of its functions. But, the other speakers argued, cavalry ought to be retained because war experience had shown it to be valuable, because it gave incomparable training in judgement and command, because cavalry was needed in certain parts of the Empire, because cavalry may be needed in the next war which would not necessarily be like the last one, because cavalry could carry out certain kinds of reconnaissance which tanks could not. These arguments were repeated throughout the period in the House of Commons. They were not peculiar to that venue, however, but were to be repeated wherever there was an argument about tanks and cavalry. (13)

This handful of charges and counter charges may be broken down further: the cavalry debate hinged on two inter related questions - had the cavalry justified its existence during the war; could its continued existence in the 1920s and 1930s be justified? The two sides of the debate took up differing positions on these questions and, as so often happens in arguments which people take very seriously, extreme charges were made by both sides. In

what follows it will be shown that, right up to 1933, it was possible for a reasonable man to hold the position that cavalry had been some use in the past and was of some use in the present. Cavalry had not been a complete waste of money and effort during the war and it was possible to see that it still could be of use to the British Army throughout the period being examined.

In weighing the claims of the various arms to share in the credit for victory in 1918 it is clear that, on the Western Front at any rate, the artillery, infantry and tank arms had all done more to win the war than the cavalry had done. The cavalry supporters were prepared to admit this; they maintained, however, that there had been occasions when the cavalry had "saved the day". Two of these, and the most important, were the two great retreats - that from Mons in 1914 and those in March and April 1918. In these cases, it was claimed, the cavalry, by reason of its mobility, had enabled gaps in the line to be plugged. After Mons, the two corps of the BEF began to fall back in the face of superior German forces and a gap, caused by the Forest of Mormal, had opened between them. The cavalry, by use of aggressive patrols and its superiority in rifle skill, had kept the German cavalry from penetrating this gap or from gaining accurate information about the BEF. So effective had the British cavalry been at keeping the German cavalry away that the German high command was consistently wrong in its intelligence of the location and size of the BEF. It

seems that the British cavalry could claim to have justified its existence during that retreat - it protected and covered the retreat, guarded the flanks of the retreating corps and kept the enemy from exploiting his position and superiority.(14) Again in March 1918 the cavalry's role was similiar. The great German attacks were overwhelming in their power and skill and the cavalry was the only available force which could move quickly from danger point to danger point. General Gough, who commanded the Fifth Army on which the worst blows had fallen, wrote:

> The cavalry had played a great part in the battle. Their mobility, and their capacity to cross any country on horses and...to get rapidly from place to place, made them more powerful than their mere numbers would suggest...They were rushed from one position to another to fill a gap, and saved many a crucial situation. They fought mounted or dismounted as opportunity offered.(15)

Again, it seems, as at Mons, the cavalry had done useful work.

But, it may be asked, were the cavalry at Mons and the 1918 retreats really acting as cavalry? The importance of the cavalry had lain in the horse's mobility which had enabled cavalry units to rush from emergency to emergency. They had not fought with swords and lances

and, with rare exceptions, they had not charged the enemy in the old way. The cavalry men used their horses to convey themselves from one part of the battlefield to another and, once there, they had generally dismounted and used their rifles. They were in fact not cavalry at all but mounted infantry. Therefore, the actions of the British cavalry in 1914 and 1918 did not really prove the necessity of horsed cavalry but the necessity for mobile infantry; if reliable cross country vehicles could be developed, there no longer would be any need for the mounted infantryman.

With these two exceptions, the Western Front did not provide many examples of the value of cavalry. Perhaps a typical example of the use of cavalry in large scale attacks was provided by the battle of Cambrai in 1917. Part of the plan of battle had been that the 51st Highland Division, assisted by tanks, should take Flesquieres and four cavalry divisions were then to pass through the infantry and chase the Germans through Bourlon Wood. The commander of the infantry division, however, did not follow the instructions of the Tank Corps regarding the employment of the tanks and, probably as a result, did not take Flesquieres. The cavalry could have bypassed the town and headed towards the wood, but that required new orders. While someone had been sent back to get these orders, the Germans recovered and closed the gap that had existed and it was too late. The only cavalry unit which managed to get up to the front line was a part of the Fort

Garry Horse which successfully charged and captured some guns.(16)

A similiar thing happened at Amiens where, again, large cavalry forces were held in reserve to exploit the tanks' successes. At noon of the first day, the German line was broken and the cavalry moved up so as to be ready to exploit the opportunity. When it reached the third objective which was already held by the infantry, the cavalry divisions dismounted to await orders and another opportunity had been lost.(17) What would have happened had the cavalry attacked is open to speculation. But it is clear that the initial days' attacks at Cambrai and Amiens had seriously dislocated the Germans and had broken their lines; it is reasonable to suppose that the sudden irruption of several thousand cavalry men into the demoralized and disorganized German rear might have resulted in a greater victory than was actually gained.

Did cavalry justify its existence on the Western Front? It is difficult to say. Certainly its mobility was of inestimable value in the two retreats and the British Army would have fared much worse had it had no cavalry. In the other attacks where cavalry sat in the rear areas waiting for the chance that never came, it could have been dispensed with. But the cavalry cannot be blamed because the infantry was unable to breach the German defences. But when the German defences were breached at Cambrai and Amiens, the reaction of the

cavalry was disappointing. Quicker reaction on the part of the forward commanders might have resulted in something, but they preferred to send back for instructions which were inevitably out of date by the time that they arrived. And yet, can anyone say with certainty what would or would not have happened had four divisions of cavalrymen come through Bourlon Wood into the rear areas where the Germans were desperately trying to mass men to stop the attack? The fact remains that, on the Western Front, cavalry was the only mobile force available for exploitation - tanks were too slow and their range was too limited for that role. Nonetheless, the cavalry saw little action on the Western Front. It seems, therefore, that cavalry was generally of little use on the Western Front although its actions during the retreats should not be forgotten.

When we turn to Palestine, however, the lesson seems much clearer. The final campaign in Palestine was almost entirely a cavalry victory. Furthermore, it was a cavalry action of a kind that had not been seen for a hundred years or more. It was on the success of the battle of Megiddo that the cavalrymen hung their arguments. Allenby's plan for the battle had been essentially a simple one. He intended to gain control of every line of communication in the area and for this the mobility of cavalry was essential. The attack began on 18 September 1918 and by nightfall the infantry had opened a corridor for the cavalry to ride through. By the morning of the

20th the 5th Cavalry Division had taken Nazareth, the Turkish headquarters; the 4th Cavalry Division had captured El Affule, a vital railway junction and the Australian Mounted Division had crossed the Jordan: the Turkish forces on the west bank of the Jordan had been completely cut off in two days. By 1 October, the cavalry forces had cleared Palestine of all Turkish resistance and had captured Damascus. In 38 days Allenby's forces, spearheaded by the cavalry, had advanced 350 miles and captured 75,000 prisoners for casualties of less than 5000. The cavalry had lost 125 men killed, 362 men wounded and 43 men missing in its triumphant advances.

Allenby could not possibly have won this battle without the cavalry. The cavalry had been assisted by armoured cars but the armoured cars had not proved the decisive element. This was shown by the fall of Aleppo. Hama fell on 21 October and the next day the 7th Light Car Patrol was ordered on to Aleppo where it arrived early the next morning; the commander thereupon called on the garrison to surrender but it refused until the cavalry had caught up. The cavalry was the decisive element.

In their arguments, the cavalrymen took every opportunity of mentioning Megiddo. Their opponents countered with the charge that the cavalry had beaten a "straw man" - the Turks' morale had been so low that all the cavalry had had to dc was round them up.(18) However low the Turkish morale may have been (and it cannot be

overlooked that the cavalry's penetration had contributed to this lowering), had not Fuller been fond of saying "that war is a matter of tools, and the highest mechanical weapon nearly always wins"? The Turks had had machine guns and with these "higher mechanical weapons" they should have been able to slaughter the cavalry. Yet, on a number of occasions, the cavalry had been able to charge successfully. On 20 September the 2nd Lancers came across a force of about 500 Turks dug in and prepared. One squadron with the armoured cars and the machine guns held the Turks from the front and the other two squadrons worked their way around the flanks and charged - with the lance. No less than 46 Turks were speared and 470 taken prisoner - cavalry casualties were one man wounded and twelve horses killed. This charge was by no means an isolated example and the battle gives many more cases of cavalry successfully charging parties of infantry.(19)

For that matter, there were even a few successful charges on the Western Front. At Cambrai the Fort Garry Horse charged some artillery (20); at Amiens British cavalry captured a wood in front of the Canadian Corps and held it until relieved (21); on 24 March 1918 about 150 troopers from three different regiments charged a battalion of the 5th German Guards Division, although the cavalry lost half its numbers it killed or captured about 200 of the enemy and stopped the attack for a time (22); on 30 March the Canadian Cavalry Brigade captured Moreuil Wood Ridge from German infantry. (23) These are only a

few of the examples of cavalry fighting infantry from their horses and winning; there were more. Of course, usually the cavalry was unsuccessful and the machine gun won (24) but it is important to remember the exceptions. The defenders of the cavalry certainly did.

What then were the conclusions about the utility of the cavalry that could be drawn from the war? The Kirke Committee was set up in 1932 to consider the lessons of the war. In its repcrt it stressed above other considerations that the great problem of the war had been the achieving of a breakthrough. Tanks were the answer to this problem, the Committee agreed, and, in a future war, a force of AFVs could probably make a breakthrough. Cavalry was seldom mentioned in the Report and when it was, it was disparaged as being too slow, too vulnerable and too lacking in fire power for any future war.(25) But the Kirke Report was not an historical enquiry; it was more concerned with making the Army better prepared for the next war. So the report from this committee does not answer the question. It is very difficult to know how to judge the effectiveness of cavalry in the First World War. In the first place, there was not very much of it, in the second place, it was not very well handled and, on the Western Front, threw away what chances it had and, in the third place, conditions seldom existed for its employment. Only in Palestine and only in that one battle did it shine. Cavalry certainly did not win the war and it is true that, most of the time, cavalry men would have been

better employed doing something else than waiting on their horses for the call that never came. Nevertheless, it is equally certain that on three occasions, in British experience, at least, it was useful and perhaps even irreplaceable.

The purpose of the foregoing brief discussion of some cavalry successes in the war has been not to show that the defenders of the cavalry were right and that cavalry was as essential to modern war as it had been to medieval war but simply to show that there had been some cases in the war that could be taken to show that the cavalry was not utterly in eclipse. There was enough doubt on the future of the cavalry to cause argument and there was enough reason to justify its retention that its defenders cannot be condemned out of hand as reactionaries. We now know that Megiddo was not in fact the harbinger of a new and glorious future for the horse and that the real lesson of the cavalry in the First World War was that there must always be mobile troops. But that judgement is based on half a century of war; wars which have seen the tank evolve far past the specimens of the 1920's and 1930's. The knowledge of the next fifty years did not exist then and there were some reasons for thinking that the war had shown that, in some limited cases, there was still a need for the horse on the modern battlefield.

However, the war was in the past. Cavalry might have played a part in it but could it have any function in a

future war with faster tanks? Admitted that the horse was considerably mcre mobile than any tank in service in the First World War, but with the Vickers Medium design of 1923 there was a tank much faster than the war time desiqns. What would now happen to the cavalry?

Fuller in a three part article in 1920 summed up his thought on the matter. Cavalry, he said, had lost its preeminence in the Fifteenth century. Megiddo was dismissed with the customary charge: Turkish morale had been low and the cavalry had won a moral victory which could have been done just as well by tanks. On the other hand, he saw the true lesson of the war in the exploits of "Musical Box" in 1918; just imagine, he invited the reader, what would have happened if all 96 Whippet tanks had broken into the rear areas in the same way. But, he admitted, the tank at the present time had defects:

> At present, however, these difficulties are not overcome; it, therefore, may with some reason be accepted that the Cavalry must exist as such until they are <overcome>.

So, Fuller was saying that the cavalry should be retained for the moment at least until the performance of tanks could be improved. But, in the third part of the article he announced that, with the Medium D, all the above difficulties had been overcome. Therefore, he was claiming that the cavalry could be replaced immediately by Medium D tanks and that "the horse <was> doomed". (26) But,

later that year, while again claiming that the tank could replace the cavalry because the two arms had the same function and the tank was better, he included two cavalry reqiments in his "new model division" which he proposed for the Army of 1930.(27) In 1922 he again declared cavalry useless and again claimed that the tank could replace it.(28) By 1925, having presumably suffered some disappointment at the Medium D's lack of success, he was maintaining that the Vickers Medium could entirely replace cavalry.(29) In later years he seems to have moderated; perhaps he came to realize that the tank that could replace the cavalry had not yet been built. At any event, in 1927 when Milne asked him for justifications of the cavalry he replied:

> So long as the infantry divisions remained unmotorized, they would want divisional cavalry, and directly they were, then their cavalry brigades...should be motorized.(30)

In his book, Lectures on FSR III, Fuller repeated this statement.(31) It seems, therefore, that Fuller's position was that tanks would, in time, replace horsed cavalry but that in 1932 the moment had not yet come.

Liddell Hart agreed in 1924 that cavalry should be retained until such time as mechanical vehicles could replace it.(32) So did Burnett-Stuart in 1928 (33) and an RTC officer in the early 1920's.(34) In short, although tanks and other AFVs would in the future probably replace

the cavalry in most or all of its functions, that replacement awaited first a suitable machine and second more money. In the meantime, the cavalry, inadequate as it was, was all the mobile force that the British Army had at its command.

The strongest arguments for the cavalry hung on the assertion that there were certain things which horses could do that tanks and other AFVs could not. Whether or not this would always be the case was something on which few people cared to hazard an opinion but, it was maintained, at the present state of development of tanks, they could not substitute for horses. The claims rested on the fact that tanks could not enter certain types of terrain and that, for certain kinds or reconnaissance, tanks were inadequate.

Tanks and armoured forces were limited in the terrain in which they could operate. Collins, after his experiences with the Experimental Forces, concluded that an armoured force could operate in most areas except in forests, mountains and swamps.(35) For these areas, it was argued, only the cavalry could do. A Captain H.P. Holt, who had served in both tanks and cavalry during the war, told the House of Commons that he was not at all certain that the cavalry was as useless as some people were claiming. Tanks could not operate over marshy ground and required bridging equipment in order to cross most streams; cavalry would still be necessary to cover those

areas.(36) A cavalry officer, writing in 1927, admitted that tanks and aircraft would dominate most future warfare but that there was a continuing need for horses in close areas where tanks could not go and aircraft could not see.(37) Another cavalry officer reiterated these statements in the following year.(38) In 1929 a writer speaking of mechanized warfare in Asia was careful to retain cavalry for covering mountainous areas although he conceded the plains to the mechanized forces.(39) In 1929 much the same thing was said: in the right circumstances AFVs had "greater speed, endurance and power of self protection than cavalry" but mechanized forces were likely to be "severely hampered" by "normal accidents of weather and ground". The decision that had to be made was not whether to replace the one arm by the other but to determine the best combination of the two. To guide this decision, the writer maintained:

> In very general terms we may say that the mobility of the cavalry is extremely flexible, but is deficient in speed and radius of action; the mobility of the land machine has great speed and radius but lacks flexibility.

It was the greater "flexibility" of the cavalry's mobility - its ability to cross any kind of terrain - that justified its retention.(40) General Sir George Barrow in 1929 was prepared to admit that, in the future, machines might very well replace horses in the Army but he doubted

their ability to do so immediately. Terrain was the limitation on AFVs. He illustrated his argument with an example from the Palestinian campaign. In the winter of 1917 a cavalry patrol climbed a very narrow trail and captured a hill. Vehicles could never have climbed the defile and, in any case, the Turks had been in possession of the only road along which petrol and lubricants could have been supplied to tanks making the attempt. In a future war mechanized forces would be essential - as essential as artillery - but there would be a need for cavalry operating in terrain impassable to tanks.(41) Again in 1930 a cavalry officer, cognizant of the necessity of mechanized forces, argued that cavalry must be retained for close country.(42)

These are reasonable arguments and the men offering them were not reactionaries. Tanks cannot climb high mountains along narrow paths, they cannot get through thick forests and, at that time, swampy ground would generally stop them. These are reasonable, sober arguments and deserve to be taken seriously. So also were the arguments which called for a role for cavalry in certain types of reconnaissance.

Fuller combined the two arguments and, in 1925, opined that the cavalry ought to be used for reconnaissance in areas where the tanks could not go.(43) Major General Davidson went a little further the next year when he said that cavalry were absolutely essential for

tactical reconnaissance and that aeroplanes could never replace it in that role.(44) Captain Holt, in his defence of the cavalry, stated that there was no substitute for cavalry for short distance reconnaissance - aeroplanes could be too easily deceived and tanks, in addition to the limits of terrain placed on them, were too noisy to be able to get close to the enemy secretly.(45) In 1927 another writer stated that some were saying that tanks and aeroplanes could replace cavalry and that he proposed to test the fitness of these two claimants to replace it. As to aircraft, they were too easily fooled and he illustrated this by giving examples of large bodies of men concealing themselves by keeping to the shadows along one side of the road. As for tanks, they could not search close areas where men were likely to be hiding.(46) In Parliament it was argued that cavalry was irreplaceable for close, silent reconnaissance.(47) A cavalry officer admitted that the lack of firepower of cavalry meant that it must be protected by AFVs but, still, he maintained, cavalry was necessary for close reconnaissance.(48) For strategic reconnaissance, formerly carried out by the independent cavalry division, Montgomery-Massingberd in 1928 proposed a formation of mechanized units with a cavalry contingent for those areas which tanks, because of their "sensitivity to ground" could not enter.(49) In 1929 it was claimed, with truth, that there existed at that time no vehicle which was capable of doing what the horses and their riders could do - pass over any kind of ground

and carry out intimate reconnaissance.(50)

General Barrow gave more detailed reasons for cavalry's advantages in this role. Cavalry could build up or down rapidly from one man to a brigade; it could, therefore, quickly split up into very small units and as quickly come together again. When a tank ran out of fuel, it stopped, it could not continue on half or quarter rations as could a horse. A small reconnaissance force of AFVs could not always be assured of an open supply line but a horse could always find something to eat. Generally speaking, he concluded, the tank was probably better than the horse at most things, but, nonetheless, the cavalry ought to be kept because of its "flexible mobility" and its ability to reconnoitre.(51)

An observer of the Armoured Force exercises wrote of the cavalry's ability to discover the whereabouts of the Force although, he admitted, this no doubt owed something to the small size of the manoeuvre area. Cavalry could reconnoitre because of its high mobility:

> Cavalry as now organized is very mobile, and during a week of recent training covered an average of thirty miles a day, while for patrols the average was much higher.(52)

As will be recalled, this rate compared very favourably with that of the Armoured Force. At the conclusion of a training exercise in 1931, the GOC Aldershot Command

stated that in his opinion cavalry and tanks were complementary - cavalry for scouting and tanks for fighting. (53) It has been shown that Fuller in 1925 accepted the necessity for cavalry in the reconnaissance role, so did Liddell Hart in 1933, albeit grudgingly, in his report on the training in 1932:

> The cavalry, also, played its part in the tactical reconnaissance, and proved that hoof mobility may mean superiority of force against foot mobility even if it does not equal tracked mobility. (54)

These too are reasonable arguments. Those offering them were not claiming that cavalry was the wave of the future but scmething much more modest. Generally aeroplanes were capable of taking over the role of strategic reconnaissance from the cavalry and tanks could do a good deal of the tactical reconnaissance. But, in close terrain, or when it was necessary to live off the land, or when it was necessary to get very close to the enemy without his knowing; it was in those cases that the horsed cavalry would be needed. These men were not arguing that no changes should ever be made but simply that not all the cavalry should be mechanized. These were reasonable arguments.

Some of the cavalry arguments were pretty silly, however. General Egerton thought that horse handlers had more intelligent faces than machine handlers; therefore,

horse handlers were more intelligent; therefore, cavalry should be retained lest the intelligence level of the Army fall!(55) An elegy on the abolition of the lance in 1928 advised its readers to keep their hopes up as "history has a happy knack of repeating itself!"(56) An Indian Cavalry officer warned that the next war would not be like the last one and that there was likely to be open fighting (he did not say how he knew this) and the cavalry would ride again. The cavalry would be "ruined" if it were converted to the role cf mounted infantry.(57) In 1922 Haig argued that the tanks, although "indispensable", had not replaced the man. That is to say, the man and his horse, for a well trained horse was part of its rider.(58) These were the cries of men completely out of touch with reality: the machine handlers might look stupid, but "the circus that smelled like a garage" was something that the cavalry men had to come to terms with. In the main, most cavalry men accepted the value of tanks although they may have had doubts on matters of detail. But did the coming of the tank have to mean that the horse had to disappear immediately? There were good reasons to keep it for a little while longer.

Most of these articles recommending the retention of the cavalry seem to have been written around the years 1927, 1928 and 1929. Part of the cause of this may have been the decline in confidence in the tank in these years but by far the greater reason was the official examinations into the future of the cavalry which were

conducted then. There were three official enquiries between 1926 and 1928: the Montgomery-Massingberd Committee, the furore resulting from a letter from Churchill advocating the reduction of cavalry and a sub-committee of the CID formed to consider the cavalry role.

In the autumn of 1926 a committee chaired by General Montgomery-Massingberd was created to examine the cavalry requirements of the Army. Meetings were held by the Committee in October and a questionnaire was sent to men in prominent positions in the Army. The questionnaire asked the respondents to suggest the role of the cavalry given two assumptions: first, that

> A Continental war is of extreme improbability

and second,

> <that> the Expeditionary Force...will be organized primarily with a view to a possible war in an undeveloped country, with probably an indifferent line of communication.

These questionnaires were also sent to a number of officers who were connected with the Royal Tank Corps or with the mechanization question. G.M. Lindsay (the Inspector of the RTC) in a very long submission argued against the horse as no longer being sufficiently mobile and advocated a completely mechanized cavalry regiment. Fuller stated that the only remaining function of cavalry

was reconnaissance and, even so, armoured cars were better than horses at strategic reconnaissance. He suggested replacing the cavalry division with a strategic reconnaissance force of three cavalry regiments and three armoured car companies, a protective reconnaissance force of five cavalry regiments and a pursuit force of three cavalry regiments and six armoured car companies. Men for the armoured car units could be found by converting three cavalry regiments into nine armoured car companies. Burnett-Stuart argued that, on the contrary, a continental war was a possibility and that the cavalry division should be entirely mechanized because the horses would be no use in such a war. His entry was marked "useless" in Montgomery-Massingberd's handwriting, no doubt because he would not accept the given conditions. Sir Hugh Elles, the wartime commander of the Tank Corps, called for a new armoured car design and maintained that the cavalry after complete mechanization should be swallowed up by the RTC.

These four responses, representing the men questioned who had tank experience are all that we need consider. It is significant that Fuller evidently believed that there was at least a short term future for the cavalry. In his submission, Lindsay wanted to abolish horses but, when he appeared before the Committee, he stated that, so long as the infantry division remained unmotorized, there would continue to be a need for mounted men to supply reconnaissance and protection. He did not think that the infantry divisions could be motorized for some time.

Therefore, of the three RTC men considered, only Elles thought that the cavalry ought to be done away with immediately and even he implied that this must await a new armoured car design. Burnett-Stuart's answer was rightly ruled out - a major European war was not to be planned for according to the Ten year Rule. At the time, many of the tank supporters believed that the cavalry had a use in modern war, however limited. The Committee itself agreed;

> ...while it would eventually be possible to replace mounted men, to some extent at any rate, by men carried in some form of armoured car, there can be no question of doing this until a cross country armoured car has been produced and proved, by thorough trial, to meet all requirements.(59)

The Committee, Fuller, Lindsay and Liddell Hart agreed - until such time as new machines made their appearance, the horse could not be completely replaced; it still had a limited future. These people would all have disagreed on the timing of the change from horses to machines but they were all in agreement that the time for the change was not yet.

An earlier report on a cavalry staff exercise at Aldershot was also considered by the Committee. This report had recommended a cavalry division of six horsed regiments, two companies of armoured cars, one regiment each of light tanks, motorized machine guns and cyclists

and four units of motorized artillery. This suggestion cannot be described as an example of conservative reaction on the part of the "horse worshippers".(60)

The Committee presented its interim report to the Army Council in early 1927. The Committee recommended that no decrease be made in the number of cavalry regiments; that the number of machine guns be increased and that the regiments at home be reorganized so as to reduce each one by 28 men and 42 horses. The mechanization of the cavalry should proceed in three stages: first the first line transport must be motorized, second should be the provision of more machine guns and third should be the partial replacement of mounted men by armoured cars. This last was to be carried out within the cavalry regiments because of their esprit du corps.

The reasons for the first recommendations were:

> It is the practically unanimous opinion of those officers who have been consulted by the Committee that the cavalry, as at present organized and equipped, has neither sufficient mobility nor sufficient firepower to enable it to carry out its duties in modern war.

The horses were expected to carry too much weight, the Hotchkiss machine guns supplied to the cavalry were not satisfactory and the first line transport was too dependent on horses.

The suggestion that the cavalry should be entirely replaced by armoured cars had been considered and rejected by the Committee. The advantages claimed for such replacement were considered to be greater speed and radius of action, the security of armour, the saving of manpower, the decrease in supplies to be carried and the fact that, with the mechanization of civilian life, the supply of horses for the Army might give out. The disadvantages of armoured cars were their inability to carry out detailed reconnaissance in close areas, the feeling that there would not be enough manpower in an armoured car unit to provide protection when the cars were at rest, the longer and more complicated training of personnel required and the "possible difficult upkeep of machines under active service conditions". Nevertheless, despite all this criticism of machines, the Committee agreed

> that, if and when a reliable cross country armoured car is produced, it may be possible, after experiment, partially to replace mounted men by armoured cars.

The Committee called for research into cross country armoured cars so that a suitable vehicle could be produced. The cavalry should man these cars because it had had experience of the cavalry role of reconnaissance and the Tank Corps had not.

To these proposals the CIGS agreed as did the QMG, Lieutenant General Campbell, although the latter could not resist recommending the abolition of the RTC with the

tanks to go to the artillery and the armoured cars to the cavalry. (61)

The final report of the Committee left the interim recommendations untouched and added that the Committee had considered calling for the abolition of the lance as a weapon of war but that experience in Palestine had convinced them that the lance (with the rifle of course) might still have a use from time to time. A new lance should be desiqned and if it could not, then the lancer reqiments should be given the sabre.(62)

Probably connected with this enquiry into the future of horsed cavalry was a letter which Winston Churchill, then Chancellor of the Exchequer, wrote to Worthington-Evans. The letter, dated 27 October 1927, suggested a very large reduction of the cavalry and the amalgamation of the twelve regiments into six. He suggested this on the grounds of economy and from a belief that cavalry was not worth the money spent on it.

Worthington-Evans passed the matter on to Milne and he invited submissions from Field Marshals Haig, Robertson and Allenby. Allenby's reply, dated 1 November 1927, dealt with the suggestion that cavalry be replaced with AFVs. There were, he admitted, excellent reasons for such an action but there were disadvantages too: AFVs could not operate on certain terrain, their armoured protection tended to make the crews blind, they were entirely dependent upon a reliable supply of petrol and mechanical

skill. Distant strategic reconnaissance was now the job of aircraft and AFVs were more and more replacing cavalry for close tactical reconnaissance but the "work of maintainina contact and linking together units on wide battlefronts will still fall to cavalry". Cavalry men had better opportunity for vision and their mentality was more alert. Allenby then made an appeal for "cold steel":

> In addition <the cavalry trooper> carries the lance and the pointing sword; and experience in the Great War has shewn that Cavalry, under a leader possessed of a quick brain and sound judgement, can still use the cold steel with as deadly effect as did the Paladins of old.

He backed up this contention with the examples of six successful "cold steel" charges in Palestine. In summing up his arguments, he returned to the argument from terrain:

> Mechanical fighters are...under certain conditions of ground, helpless; but there is practically no country in which cavalry cannot act.

For reconnaissance cavalry could be more easily concealed than could tanks and it was "silent as well as swift". The horse compared favourably with the tank in endurance.

Robertson's paper arrived two days later. The war did not prove that cavalry could not attack forts or dug-in infantry - that had been known for fifty years and in

fact cavalry could do many things outside of the battle line which AFVs could not. The British Army might find itself involved in any one of several theatres of war and it would be a mistake, he argued, to lean too heavily on the results of a major European war - in many parts of the world, cavalry would be more suitable than tanks. There had already been enough cavalry reductions and more would be dangerous.

Haig believed that money could be saved in other directions than in reducing cavalry regiments "which once abolished cannot be replaced without years of labour". He thereupon suggested several things which would not have saved very much money.

Haig's answer was of little use and suggested that he was out of touch with currents of opinion - as, indeed, he was in 1927 - but the answers of the other two were reasonable. Basically Robertson and Allenby argued that cavalry could do certain things better than the existing AFVs could and these things were the usual two - the cavalry could scout more effectively at times and it was not as limited as to terrain as were tanks. Allenby's remarks about the sabre and the lance need not, perhaps, be taken too seriously and he did not devote much space to that part of his answer.

The submissions of these three old soldiers display a touching ignorance about the machine. Allenby had worried about ensuring a supply of mechanics for armoured car

units. He should better have worried about ensuring a supply of trained horse handlers - car ownership in Britain was growing much faster than horse ownership. One wonders whether any of these men had thought much about mechanization or knew much about it. These three submissions illustrate Broad's remark that the British were "slow to take to the machine". (63)

On 3 November Milne produced his statement and sent it to the Secretary of State for War:

> Ultimately cavalry must give way to a mechanized arm <but, until mechanization be completed> there must be an interval during which the Army in war must have some fast moving troops which will be able to protect it and to perform the close reconnoitering duties which aeroplanes cannot do. Both these functions must be performed for the present by the cavalry until we can afford mechanization.

With this memorandum he enclosed Robertson's and Allenby's letters.

While he presumably had been awaiting letters from the three Field Marshals, Milne had composed a letter to Worthington-Evans which had been sent the day after Churchill's letter had been written. Milne stressed the importance of cavalry for scouting and denied that armoured cars could replace them as yet:

> These machines are at present no more fit to replace the horse than the early motor cars were to replace the wagon.
> For the present a force of cavalry is the only one that can be relied on to perform reconnaissance duties in ordinary broken country such as forms the great proportion of the earth's surface.

Included in this submission was a memorandum on the reorganization of the cavalry signed by the Military Members of the Army Council.(64) The cavalry depot was to be abolished and training handed over to the home regiments; in each home and Egyptian regiment one of the three squadrons should be done away with (this should also be done in India if the Indian government were agreeable); the number of machine guns in the regiments should be increased to twelve; first line transport should be motorized; the lance should be abolished as a weapon. Since 1914 nine regiments had disappeared and these new reductions which were being proposed would do away with 6,373 officers and men. But the cavalry would keep their horses: "...an efficient mechanical substitute for the horse does not at present exist". AFVs were in the experimental stage

> and to spend money on production now, even if it were available, would be a reckless waste of public funds.

To mechanize the cavalry would require a large increase in

the number of trained mechanics but there was not even enough money to maintain the existing armoured vehicles. In conclusion, Britain's leading soldiers agreed:

> Replacement of mounted troops by mechanized forces must be gradual...<there was much to be perfected in the machines' performances and> ...the capital expenditure will be great...Meanwhile we cannot dispense with the mobile arm we have...

Most arguments for the abolition of cavalry are based on the state of static warfare which arcse in France in 1915...we are much more likely in the future to be engaged in a ccuntry resembling Palestine rather than France, and against an enemy more like the Turks than the Germans.

When a suitable machine has been devised, it may, and probably will, be advisable to replace the horses, but that time has not come yet, nor is it likely to for some time.

Faced with this unanimity, Worthington-Evans wrapped the whole file up and passed it along to the Prime Minister expressing his agreement with it and that was the end of Churchill's scheme.(65)

On 16 November 1927 the Cabinet agreed to appoint a sub-committee of the CID under Lord Salisbury to "enquire and report what strength of Cavalry of the Line should be maintained in the British Army and how it should be organized". The Committee duly reported and the Cabinet considered its report on 6 June 1928. After the enquiries that had gone before, it is not surprising that the Salisbury Committee had nothing new to say. It could not recommend any changes in cavalry organization (leaving aside the Indian cavalry over which it had no authority); it approved the War Office's policy of "progressive mechanization" of equipment; it drew the Cabinet's attention to the traditions of the cavalry and their importance. No doubt because it was a committee of cabinet ministers, it recommended that the conversion of cavalry units to mechanized units should proceed "with due regard to financial consideration". That is, slowly. Churchill and the Secretary of State for Air dissented from the Cabinet's approval and urged greater haste in mechanization. Appended to the report was a chart which showed that France, the Soviet Union and the United States all had a greater proportion of cavalry in their armies than Britain and that Britain's cavalry had been much reduced: in 1914 the Regular Army at home and abroad (but excluding India) had had .66 cavalry squadrons per battalion; the figure in 1928 was exactly half that.(66)

We have now heard from some of the military heads of the Army, from the journal writers and from several of the

tank spokesmen on the reasons for the retention of horsed cavalry forces; what of the political heads of the Army? Here we find the same arguments and, once again, most of the interest is centred around the time of the cavalry enquiries.

In 1926 Worthington-Evans was asked in the House of Commons whether it was not true that the experience of the war had shown that the cavalry had "ceased to be a necessary element as an eye of the Army" and useless for attack. He replied: "No Sir, and France was not the only seat of war". (67) He made a fuller statement the following year. Some people said that the day of the cavalry was over and some said that it was still necessary for certain things. He said that there was not yet enough information and that "the best solution appears to be a combination of the two <AFVs and horses>". The recommendations of the Montgomery-Massingberd Committee on increasing machine guns and motorizing transport would be put into effect (typically only half the recommended number of machine guns would be added). Mechanization, he added, should not be too hurried lest mistakes be made. The horse still had its uses and could not yet be replaced because machines capable of taking over from horses had not yet appeared. Cavalry had been reduced and, when money permitted, would be further mechanized. (68) In 1928 a Member attacked tanks and praised cavalry and was told by the Financial Secretary of the War Office, Duff Cooper, that the position of the War Office lay between the two extreme

positions in the debate.(69) Tom Shaw, the new Secretary of State for War in the Labour Government, did not differ from his Ccnservative predecessors: horses would be kept in the British Army until it was certain that they had no future "and I think it is a fairly long time ahead before they can be dispensed with fully".(70) In 1933 Duff Cooper pointed out that the British Army

> has never been designed to take part in great Continental wars. It has been designed for...the purpose of maintaining order in the British Empire.

The next war the British would fight might well require cavalry.

> As far as my own opinion is concerned...I am convinced that the cavalry has been sufficiently reduced already...(71)

Therefore, three War Ministers, in office from, effectively, 1924 to the end of the period (72) all accepted the arguments advanced by the Montgomery-Massingberd and Salisbury Committees - cavalry was still useful for certain things and, until there was a lot more money available, mechanization of the cavalry must proceed slowly and carefully.

From the enquiries of 1927 and 1928 the cavalry slowly began the process of conversion from horses to armoured cars. It was accepted policy that eventually the cavalry would be mechanized, as a committee formed to

consider the mechanization of the 11th Hussars and the 12th Lancers admitted in 1927:

> ...the Committee wish to submit the view that the conversion of these two regiments is the first step in a policy leading to the manning of the main fighting tank by the RTC and of armoured cars by Cavalry.(73)

Milne himself wished to see preparation for this coming mechanization begin early:

> I would make it an essential that no officer in due course is given the command of a cavalry regiment unless he has put in four years' seconded service in a cavalry armoured car regiment.(74)

The reorganization proceeded slowly and equipment was found for the new armoured car regiments by disbanding RTC armoured car ccmpanies and retaining their personnel to form new tank battalions.

How did the cavalry itself take the loss of its horses? There are two differing indications. The first is a bit of doggerel in the Cavalry Journal of 1928 which ends:

> And a bloke wot's fond of 'orses and been soldierin' for years
> Don't want to be a 'shuvver' in the Armoured Car-biniers.(75)

More important however was an article by the Editor of the

Cavalry Journal and the Colonel of the 11th Hussars, Major General T.T. Pitman. He condoled with the regiments for the loss of their horses but declared that the future of cavalry depended upon its being made hard hitting and that meant AFVs. He concluded on the optimistic note that now, after 3000 years, the cavalry was again being put in chariots. (76) Pitman's response was the more important of the two and prcbably represented majority opinion - the cavalry men were sorry to lose their horses but, in the end, most of them did their duty and adapted to the new situation.

The increased provision of mechanized transport enabled a considerable reduction to be made in the weight carried by the horse as a demonstration in 1930 showed. The weight carried by the horse (assuming the rider to weigh 160 lbs) had been reduced from 282 lbs 15 3/4 oz in 1918 to 250 lbs 4 1/2 oz in 1930 - a reduction of 32 lbs 11 1/4 oz. (77) Needless to say, this made the horse and its rider rather more mobile than they had been.

The gradual and progressive mechanization of the cavalry after 1926/1927 may be shown by the Army Estimates. In 1926/1927 there were about 7000 horses in the cavalry and by 1933/1934 this had been cut to about 4500; fodder showed a similiar reduction: in the first case nearly 700,000 Pounds had been spent and in the second year, this figure was down to 400,000 Pounds. (78) It cannot be denied that real and substantial progress was

made on the mechanization of the British cavalry in this period.

The cavalry controversy, now surveyed, can be fitted into the larger picture of the tank controversy. Certain accusations may now be seen to be unfounded. It is not true that "the British Generals wanted cavalry, not tanks"(79); the British Generals tried to find a balance between the two arms. It is not true that the "majority of the cavalry officers were reluctant to admit the necessity for any change"(80); they were prepared to concede most of the traditional cavalry roles to armoured vehicles and aircraft. It is not true that "important and intelligent commentators were prophesying that the horse would play a vital and possibly even decisive role" in the next great war (81); it was believed the horse would have a small but important role in colonial wars, but few if any thought there would be much need for a horse in Europe. No published evidence (and that is the only evidence that remains) suggests that the cavalry had a "deep seated...dislike" of the RTC.(82) According to Broad, the battles of the Second World War were not lost in the Cavalry Club as Liddell Hart had said.(83) The cavalry has been unfairly maligned and the reasons for its retention have been unjustly ridiculed.

Every time that the cavalry role was questioned or examined in this period the same arguments cropped up with monotonous regularity. Horses could go places which were

closed to tanks; horses could do a certain type of scouting in a way that tanks and aircraft could not; there was no vehicle that could replace the horse in these roles yet; therefore, the horse must be kept a little longer. There was a remarkable degree of unanimity in these arguments. Leading cavalry men, politicians, senior officers and the principal tank spokesmen (regardless of what they might have claimed later) all agreed - one day the cavalry would leave its horses but that day was not yet. The traditional roles of cavalry had been strategic reconnaissance, tactical reconnaissance, protection and the charge. The charge was dead and had been for years; no responsible spokesman forsaw cavalry charging the enemy unless that enemy be ill-armed tribesmen. Protection of columns on the march was a matter for the greater firepower and mobility of armoured vehicles. Strategic reconnaissance had been taken over by aircraft which could do it faster and more accurately. All that remained for the cavalry to do was tactical reconnaissance and even that was admitted to be principally a task for AFVs. When, however, it was necessary to get close to enemy formations in silence, there was no machine that could replace the horse. When it was necessary to send forces up narrow mountain paths or through thick forests or across swampy ground or into towns, the horse was the only mobile transport available. The new role of the cavalry was to be a modest one. Transport in close areas, very close reconnaissance and dealing with mobs. That is a

very limited role. The cavalry was not, in fact, basing its arquments on its role as cavalry per se; all that was arqued was that the horse represented a "prime mover" in certain limited conditions. No one seriously suggested that the cavalry would ride into the charge with sabre and lance and scatter the enemy to the winds. A small number of hcrses were still necessary pending their replacement by machines. There was nothing reactionary or blinkered in these assertions - responsible spokesmen simply said that, until vehicles were produced in adequate quantity and quality, there remained a small but important role for the horse.

It was probably not even believed that the horse would have even this small role against a first class ennmy. But the Army was not allowed to think about first class enemies - there was to be no great war for ten years and no preparations could be made for one. If the cavalry could be shown to have a role in small scale war and in the normal peacetime occupations of the Army abroad, that was enough.

But, the tank advocates argued, money was spent on cavalry which could better have been spent on tanks. Had the cavalry been entirely abolished in, say, 1923, this would have freed several hundred thousand pounds a year which could have been applied to the increase of the Tank Corps and in research and development and in production of new tanks and armoured cars. It is true that this could

have been done had there been a will. But, the thing that the tank advocates forgot and still forget is that, if this had been done, the British Army would have been entirely denuded of its only mobile arm for several years. The cavalry could not have been mechanized instantaneously and, in the time between the abolition of the horses and the production of the new tank units, there would have been no mobile troops at all. In any case, easy as the transformation might sound on paper, what tanks were to be used? The Vickers Medium? But the Vickers Medium was too slow, its armour was inadequate, it broke down too easily, it was too noisy. The Sixteen Tonner? But it cost too much and, furthermore, could not have been in production until the 1930's. The Independent? But it took too long in the development stage and was even more expensive than the Sixteen Tonner. Such mechanization awaited a new tank, but the new tanks were not forthcoming. Ignoring the prcblem of the tanks, could not the RTC have been built up until it could take over from the cavalry? Perhaps, but only if there were the money to pay for both the cavalry and an expanded Tank Corps. But there wasn't and there wasn't going to be any. What other possibility was there than what was done? It was all very easy for the tank prophets to talk about the future mechanized British Army, but the future they spoke of would have to be free from Treasury control. The mechanized Army came to pass but only after the emergency of war had loosened the purse strings. The problem of the peace time Army

reformer was vividly described by Wavell, himself no reactionary. It was that of an architect who had to modernize a house with the people still living in it; to modernize the house, further, with no more money than that allowed for normal housekeeping expenses.(84) The Army had to be modernized and the cavalry had to be mechanized - that was recognized by all the commissions and by all the enquiries - but, at the same time there must be enough Army and there must be enough cavalry to do their jobs.

Two important and hitherto unnoticed facts stand out in the cavalry controversy. The first is that the cavalry men were on the defensive. For the most part responsible spokesmen did not deny the more important ex-cavalry roles to the tanks and the aeroplanes. This talk about cavalry men being against tanks is not true: the cavalry men were concerned to defend a limited role for the horse against the attacks of the tank men who, untruthfully for conditions at that time, claimed that the tank could immediately take over from the horse. The second fact is that it was the <u>horse</u> which was being defended and not the <u>cavalry.</u> All the arguments hung on the ability of the horse to move in country closed to vehicles. The cavalry argument was simply that the horse, as a vehicle, had still a limited part to play in war.

Historians of the controversy are ignorant of cavalry actions after the First World War. It is bad enough that Megiddo is treated slightingly but let us mention some

other facts. What is to be made of Budyenny's use of cavalry in the Russo-Polish War? Or the use of cavalry units by the Red Army in the Second World War when the cold had stopped tank engines? What is to be made of the following episode?

> Reed rounded up some 60 captured German Artillery horses, improvised saddles and other equipment, and mounted a troop under the command of Captain Tom Stewart, son of the Tennessee Senator.
>
> The Troop operated very successfully for more than a week, capturing a number of small towns and several hundred astonished Krauts <sic>.
>
> Patton was very much elated over the innovation and sent a detailed report on it to SHAEF...
>
> 'If I'd had a division, or even a brigade, of horse cavalry in Tunisia and Sicily,' he declared, 'the bag of Germans would have been a good deal larger. Very few would have escaped, because Cavalry can conduct a pursuit much faster than tanks under certain conditions.'(85)

This happened during the Third US Army's campaign in the Saar in November 1944. No one can say that Patton was a reactionary or a man who did not understand the use of armour. The Israelis today use camel patrols in the Sinai

to check smuggling and infiltration. There is apparently a movement away from snowmobiles in the Canadian North and a return to dogs: dogs don't break down and one cannot eat a snowmobile. The cavalry men in the 1920's and 1930's were right - in certain, limited circumstances, horses and other animals can do things that machines cannot.

> The relative value of horse cavalry was certainly diminishing, but to write of it as if it had none is unjustified and unjust.(86)

We will leave the final verdict with General Sir Charles Broad, one of the leading practical tank men. He did nct agree with Liddell Hart's alleged remark that the battles of the Second World War had been lost in the Cavalry Club. In the early years, "tanks could not compete with cavalry for speed". There was prejuduce against the "greasy mechanic" he thought, but the reasons for the retention of the cavalry were the varied terrain in the Empire, the memory of its importance in the South African War not long before and the Battle of Megiddo. "The cavalry was therefore a well tried arm".(87)

CHAPTER EIGHT

Conclusion: The Policy of Mechanization

Was there an official policy on tanks between 1919 and 1933? It seems that there was. Implicit in the foregoing chapters is a blueprint. There was orderly progress from the smaller to the larger - by 1933 there was a tank brigade and the tank brigade had the beginnings of a doctrine. There was never very much doubt about the principle of tanks - however organized or of whatever type to be decided later, the British Army must have them. Various designs were tried out and, at the end of the period thinking had settled on three kinds of tanks - medium tanks, close support tanks and light tanks. Trial and error established the fact that tanks, organized into all tank units, would prove of great value in what had been traditionally cavalry roles. We have seen a large measure of agreement that, eventually, pending designs and money, the cavalry would be almost entirely mechanized. Underlying all this was a policy of small scale and careful experiment. The small scale of the experiments was dictated by the parsimony of the governments towards the defence services; the care was dictated by a desire to get it right. This was a policy implicit in events, the policy could be named "slow and steady".

Was this an explicit policy? "Slow and steady" may be seen in practice but was it admitted in fact? Let us examine the statements of the Secretaries and Undersecretaries of State for War made in Parliament and see whether we can discover a policy. In 1920 appeared the following:

> These next years may be considered an interim period...Our finances are so limited that we must look to every penny. We cannot afford at this stage to make a false step.(1)

That year Churchill stated that, so far as mechanization was concerned, the War Office must move carefully and see what developed.(2) Worthington-Evans made a statement in 1921:

> The ultimate practical use of tanks and armoured cars and their relation to the other arms of the service has not yet been finally settled. The general view is that mechanical means of fighting must be developed to the fullest extent.(3)

He returned to the fact that, unlike other armies, the British Army was not based upon the size of other armies but in relation to its numerous responsibilities.(4)

The Earl of Derby repeated this in a lengthier statement in 1923:

> We have to provide an army sufficiently big to garrison our various ports all over

> the world, and provide drafts for them; and at the same time provide a small mobile force...which can be rapidly mobilized and sent abroad. Our Army has never been formed...to provide in peacetime for a great European conflagration. We must try to have a nucleus so that we can extend it in time of war, if a war ever occurs again. In time of peace it would be folly to attempt to keep up any such Army as foreign nations maintain.(5)

In 1924 Stephen Walsh, the Labour War Minister, answered a question calling for a statement on mechanization by saying that advances were being made and that the subject was under constant consideration.(6) That year, Atlee, the Undersecretary, made another statement:

> Our Army is essentially...a nucleus army; it is there to support the various garrisons we have...all over the world... Every step in the organization of the Army...will be taken with the utmost care.(7)

Worthington-Evans returned to the War Office and in 1925 made the following remarks:

> Continual progress has been made during 1924-25 in the experimental work necessary

> before a definite policy regarding the mechanicalization of the transport of the fighting units of the Army can be decided, and the coming year will be devoted to further experimentation.(8)

and

> ...the future of mechanicalization is full of difficulties which must be gradually studied before definite decisions are made.

But, he warned, so far as mechanizing the transport was concerned, unless and until a machine with commercial possibilities had been built, mechanization would be too expensive for the Army to attempt by itself.(9) In 1928 he promised to increase the number of tanks as funds permitted (that is to say slowly).(10) In the House that year he returned to the theme. The War Office would keep the tried and true until experiment clearly pointed to the new way. If he were free to do so, he said, he would produce the new modern units first but, because he was forced to be as thrifty as possible, he must scrimp and save and make small experiments.

> The policy we are pursuing is gradually to convert existing formations...into formations based on increased mobility and firepower given by the use of the internal combustion engine...(11)

Next year he boasted

> we can confidently claim to lead the world not only in our equipment of tanks but also in our ideas as to their use in war. Money voted is being used on a definite and progressing plan.(12)

In 1930 Labour was back in power and its Secretary of State for War, Thomas Shaw, stated that his predecessor had made a full statement on mechanization and, as this plan was progressing satisfactorily, he had nothing further to add.(13) Later in the debate, he said that the Government had somewhat cut down on mechanized vehicles because they were all experimental and that it did not want to find itself in the future with a lot of obsolete vehicles should new improvement in design make the old ones out of date.(14) Next year Shaw expanded on this:

> <The policy of the Government> is not to pile up material of a character which is affected day by day as inventions or science move forward, but rather to experiment until a satisfactory type has been found, and then build up the stocks that are required.(15)

Later that month he repeated that it was policy to experiment slowly and carefully with mechanization until a proven solution appeared.(16)

Next year Duff Cooper appeared to contradict these assertions that there indeed was a policy on

mechanization:

> <mechanization in the past> has been governed from year to year by the financial and other considerations involved.(17)

He did not mean that the new National government was overthrowing the previous policy of "slow and steady" but simply that the period of experimentation had not ended - there was no final policy on the matter. Next year, 1932, it was stated that progress of mechanized experiments were proving of increasing value although their speed was hampered by financial considerations.(18) In 1933 Duff Cooper flatly stated that there had been no change in the mechanization policy.(19) A few days later he restated the proposition that the War Office must move slowly on the matter.(20)

> ...we are...anxious...to bring the Army up to date in every way...hampered and delayed by the limitations of expenditure...<and>...also by the natural caution which must accompany any progress in that direction owing to the uncertainty...as to whether the latest invention is the last invention, and whether the newest thing is really the best.(21)

With 1933 we come to the end of the period which we have chosen to examine but, because they could have been

said at any time from 1919 until 1933 we should consider two others of Duff Cooper's utterances in 1934. The four purposes of the British Army were the protection of naval bases, the maintenance of defence and order in certain territories, the protection of Great Britain and "in addition to the three great purposes" (and presumably, therefore, least in importance), the provision of a force to defend Empire interests outside the United Kingdom. Certain military critics, he said, seemed to think that the last menticned purpose was the most important; it was not. (22) Later that year General Spears pointed out that the Army had been making experiments with mechanization for ten years; when were the experiments going to end? When was something positive and permanent going to be decided? Duff Cooper replied that experiments must continue and must never stop. (23)

In these statements from the responsible ministers concerned we find once again the unanimity which we have seen before on matters of mechanization. The governments from 1919 to 1933 (and beyond) had a clear and consistent policy regarding the mechanization of the British Army. This policy may be described under seven parts and all the Secretaries of State for War, regardless of party or time would have agreed with these seven:

1. Mechanization is of great value both as a means to efficiency in the Army and as a means of reducing expenditure thanks to its greater economy of effort.

2. The British Army is not now, and never has been, organized either to fight a major continental war or scaled according to possible major enemy armies. The size and composition of the British Army is now, and always has been, determined according to the responsibilities of the Empire which do not, generally, require forces organized to the last pitch of modernity. The British Army at Home is a nucleus which exists partly to assist the overseas detachments and partly to provide a basis from which an expanded army may be created. A large war which would necessitate such an expanded army is not likely in the near future.

3. Financial restrictions of overriding importance preclude a high level of spending on new machines and large scale experimentation.

4. In a time of such progress and development in science and technology it would be a serious mistake to acquire a large number of a particular vehicle because it may be made obsolete in the near future by some further development.

5. Mechanization of the Army is a complex and difficult matter and therefore calls for careful and continuing experimentation before permanent decisions are made which may turn out later to be in error.

6. There is no particular hurry. There is no evidence of a great war in the near future which would require mechanized forces. In the meantime, the existing forces of the Army are adequate to maintain order in the Empire.

7. Therefore, progress in re-equipping and re-organizing the Army must be slow and steady.

We who have seen a savage and destructive war and the resultant Cold War with its miseries both of which are, in part, attributable to the British Army's policy of not expecting a major war in 1939, may call this policy short sighted or even criminally irresponsible. And it is true - had the British had a larger and more powerful Army organized for continental war it is at least conceivable that Hitler and Mussolini might have thought more about risking Britain's enmity; failing that, it is possible, as Liddell Hart believed(24), that a larger and better equipped British armoured force might have made a decisive difference in 1940. However this may have been, such speculations, however interesting and provocative, are merely speculations; they are hindsight, that false friend of the historian. The British Army did what it did and, given the circumstances - the financial situation, the ten year rule, the problems with tanks, the cavalry question, the general atmosphere of international amity, could anyone have done better? The men of 1919 to 1933 did not know that there would be a war in only twenty years after the last one had ended with such high hopes; they could but make their decisions living forward one day at a time. Whatever one may think of it, however, the British governments had a policy on mechanization and they kept to it throughout the period under consideration. "Slow and steady" seemed the best idea at the time.

And what where the times? In 1932 Burnett-Stuart (himself no "reactionary of the bow and arrow school") wrote a letter to Liddell Hart. Because it so eloquently and even movingly sums up the background against which mechanization had to contend and because it was written by a man who had been associated with the early experiments on Salisbury Plain in 1927 and 1928, it deserves to be quoted at some length:

> ...I can offer you a brand of criticism (if you want it) rather different from that which you can get from junior General Staff officers or professional reviewers or the outside public.
>
> Imagine yourself the responsible head of the army and read your book <The British Way in Warfare> from that standpoint. Wouldn't you rather resent your own accusations of incompetence and rather contemptuous assumption of superiority? And wouldn't all sorts of difficulties confront you, which as a critic you make no allowance for?
>
> Here are some of them:- (1) Your army is supposed to act as a police force in peace, and as a thunderbolt in war. The two functions are incompatible. I, for instance, in the Near East must have men. I cannot with machines occupy and control

large cities, protect scattered communities, deal with civil unrest, or occupy and pacify areas. Partial mechanization simplifies my task, but total mechanization would make my task impossible. The same considerations apply to India and to every other overseas garrison. Meanwhile the army at home is a mere skeleton and a feeder for the overseas garrisons. No doubt, if you could reduce your garrisons abroad (which you cannot do as they are far below the safety mark already) you could reduce the feeding establishment at home also, and so save money with which to form a small ultra modern striking force. Although as a matter of fact if you dared to show a possible saving on minimum peace requirements, the army vote would be cut at once and you would be worse off than before!

(ii) <sic> All progress towards increased military efficiency in peacetime, especially if new appliances are involved, is at once branded as <u>offensive</u> militarism, and our own so called statesmen at once rush to Geneva to have such aggressiveness stopped. Look

how inconsistent you are yourself! You say you would like to abolish all air forces - and yet you demand tanks!

(iii) All the army's work is done in an atmosphere that is not only unsympathetic, but definitely antagonistic. Neither the Cabinet, nor Parliament nor the public nor the Civil Service (including the War Office civil staff) care two hoots about the army. Finance is a constant nightmare. So long as there are three services and three staffs, there is interservice rivalry in which the dice are loaded against the army; and that is likely to continue as it is the policy of all governments to play the services off against each other. Finally all press criticism of the army command is either contemptuous or hostile, and incredibly ill-informed. The result of all this is that the energies of the Higher Command are exhausted in efforts to keep what they have, in living from hand to mouth, and in making bricks without straw - hardly the atmosphere in which to fashion the Army of a Dream.

I could go on for a long time in this stream, but I cnly want to make the point

that you, in common with most critics and students however erudite, do not make enough allowance for the practical difficulties of those who bear the responsibility for keeping the army going at all.

I never for a moment suggested that the army was 'impeccable' - it is just a human show like other shows. But it is hardly fair to condemn it for having made a complete b-s of its four last major wars, in which the preparations, the policies, and to a large extent the operations were dictated by ministers and not by soldiers, while withholding all credit for what the army had done before, and in between, and is doing now. Heaven knows the army is not 'complacent' - it is merely helpless and a little cynical. After all it is the army itself that is going to be killed, and so it is naturally interested about its own efficiency or lack of it.

You ask me if I 'seriously contend that if the General Staff said that our divisions must be reorganized, the government would interfere?' I do. The Cecils and Hendersons would say we were

crashing the disarmament conference, the Foreign Office would say that we were taking a new lead in the competition in armaments, the Treasury would say that we were wasting money, and all the ex soldiers in Parliament would say we were doing it wrong. We all know that our present old-fashioned divisions are suicide clubs; but <it> is not merely a question of reorganizing them, but of remodelling our whole military machine and its responsibilities in peace so as to admit the creation of modern war formations. We are bound to the wheel and there is no free-wheel attachment to our wheel!

However, I must stop. Don't think that I am a defeatist, far from it - things might be much worse and are getting better. And don't think I am registering resentment. I have no use for anyone who doesn't say what they <sic> think (so long as they think intelligently!), and if I wasn't genuinely interested in your views I wouldn't have inflicted this letter on you. (25)

Liddell Hart's answer to this letter did not respond to the principal point that Burnett-Stuart was making. Liddell Hart merely said that he did not believe that the politicians were the enemies of the soldiers and that, in his opinion, the "frccks" were not to blame for all the Army's misfortunes.(26) He did not defend himself against the charge of not making enough allowance for the practical difficulties of the senior officers.

It is unfortunate that he did not respond to this charge because it concisely states one of the difficulties of the position of the tank reformers. It was all very well to talk, and as we now know, to talk accurately of the future importance of AFVs, but there really was neither money nor apparent need for such forces on the large scale that Liddell Hart, Fuller and the rest were calling for. We have already seen some of the difficulties presented by the situation: the fact that, whatever the future might bring, the British tank designers could not produce a satisfactory medium tank that was either effective or economically worthwhile.(27) It has been shown that, before Broad's experiments in 1931, there was simply no means of controlling large scale armoured formations. We have seen that, after about 1927, there were good reasons to suggest that, in future actions, tanks might fall easy prey to light, rapid-fire anti-tank weapons. Given the absence of a satisfactory medium tank, the lack of adequate control of armoured formations, and the possibility that such armoured

formations might be too vulnerable to have much use, was the future of the tank indeed so obvious? When we add to these internal problems connected with tanks, the undoubted desire of all the inter-war governments, at least until war seemed more likely, to spend no more than the bare minimum on defence, can we say that, even if desirable, it was practical to expect the British Army to go in for tanks in a large way? Burnett-Stuart was describing the situation to Liddell Hart: the Army was at the very lowest priority of the three defence services, and they themselves were probably at the lowest priority in government spending. Within the Army itself, tanks could only be bought after the essential overseas garrisons were provided for. But the garrisons took up so much of the Army's time, money and effort that there was very little left over. Indeed, in many ways, it was a wonder that the Army was able to do what it did in connection with tanks.

And what had been done in these years of experiment? In the first four or five years, not very much was done. But, by 1923, the Tank Corps was permanently established and established free from the control of the other arms (something that was not done in other countries). Between then and 1927, the Royal Tank Corps slowly equipped itself and got used to comparatively fast tanks and the resultant tactics. In 1927 were held the experiments which were to be followed with such interest in other countries. These led directly to further experiments with brigade size

armoured units and, eventually, to the formation of such units.

This does not, perhaps, sound like much at first. But consider what it entailed. Tactics had been developed for tanks in the First World War and they had been worked out to a fairly high degree of sophistication. But these were tactics for a tank with a top speed of about 4mph and a tank which was designed to assist the infantry through a very small and lethal area. After the tanks had done that, they could fall apart - their job was done. Obviously, such tactics were no good at all as a basis for the Vickers Medium. That tank, for all its deficiencies, was a great deal faster than any of the war time models and it had been designed for a much different purpose. Therefore, tactics had to be developed by the RTC from a completely fresh start after it began to get its new machines. Furthermore, such high speed tactics were much more difficult than the war time tactics. In the war, sophisticated communications had not been necessary but, in a high speed attack into the enemy's rear areas, good communications were essential. In the war, logistics had not been very important in tank attacks - the tanks could carry all that they needed themselves for their short range movements. But, again, this could not be so easy in the new tactics. All these matters had to be worked out by the Tank Corps. Obviously, such things took time.

There were still more problems. Maintenance of tanks in action had not figured very largely in the war but, in long distance sweeps, the tanks would have to be able to be repaired by their crews away from complicated workshops. There was a need for a great deal of firing practice. There were a host of details to be worked out in connection with the co-operation of tanks with the other arms. Tanks in the war had not done scouting, but that was a new role for the post war tanks. The fact that is often forgotten is that there was virtually no similarity between the wartime tanks and the post war tanks. The fact that both vehicles are named "tank" has tended to conceal their differences. In 1923 the Royal Tank Corps had to start completely anew - the only legacy from the past was a confidence in the future.

Between 1923 and 1933 - ten years only - the RTC made a very good beginning at fashioning the host of doctrines on tactics and maintenance, gunnery and all the rest of it that was necessary before the dream of the tank pundits could come true. However, it must not be forgotten that this development did not take place in a vacuum. The background factors mentioned in Chapter 2 made it clear that a large scale, rapid development of tanks was simply not feasible.

Lest it be thought, in all this criticism of the Tank Corps and its spokesmen that has been in evidence above, that this work is taking a one sided or purely negative

view of the tank controversy, a number of things hitherto taken as understood must be made explicit. Generally speaking, with a few exceptions on points of detail, the tank propagandists were reasonably accurate in their forecasts of the tank in future wars. We have seen tanks come to dominate land warfare; nowadays, infantry do ride around in "tanks" (armoured personnel carriers); the existence of real cross-country machines has changed logistics; armoured spearheads have put mobility and generalship back into war. Had the tank pioneers of the time - Fuller, Liddell Hart, Martel, Broad, Lindsay and Hobart - had their way in mechanizing the British Army, it is possible that subsequent history might have been very different. As we now know, they were generally correct in their perceptions of the First World War - the lessons they derived concerning the importance of tanks from the limited experience of that war were substantially accurate. The influence of Liddell Hart and Fuller especially on matters of strategy and tactics can hardly be over emphasized - so much of what is now accepted military practice had its origins in their writings that their influence cannot be ignored. The tank pioneers were prophets and, in company with other prophets, they had a distressing disinclination to pay much attention to details. But they were true prophets.

Nevertheless, even bearing in mind the long range accuracy of much that they said, it must be remembered that, at the time, matters were not so clear and distinct

as they are today. The tank of the 1920's was not the proven, reliable weapons system that it is today. There were reasons that seemed good at the time for thinking that the tank spokesmen might be over estimating the potentials of the tank. It was not possible, for reasons of control and logistics, to make the sort of long range movements that they were calling for. These matters were all satisfactcrily worked out later, as the tank pundits were sure they would be, but they were worked out under pressure. This pressure was not present between 1919 and 1933. Tanks were a weapon that would only be needed against first class enemies and there was nothing to suggest at the time that there would be any first class enemies for some considerable time. Had there been the pressure of preparing for war before 1933, then, probably, tank development in Britain would have been as fast as it was in revanchist Germany.

As it was, very early a policy was adopted by the government. The policy was slow and cautious: experiments were to proceed in a small scale and a cadre would be established which could be expanded in time of need. This was not a dramatic policy and it was too slow for the liking of the tank men who did not believe that there was much to experiment about, but it was a policy nonetheless and one well suited to the financial and strategic climate.

The tank controversy therefore stands revealed not as a Manachaean struggle between "progressives" and "reactionaries" but as a much smaller disagreement. The "progressives" and the "reactionaries" agreed on a lot of things: tanks were here to stay and, in future, tanks would supply most of the hitting power of the Army - in short, tanks were essential. They disagreed on the smaller matters of how much time was available for experimentation and on how much of the tank case had been established already by the war. The "progressives" wanted progress to be as fast as possible; the "reactionaries" felt that there was lots of time. The "progressives" believed that the tank's case had been finally established as true when it "won the war"; the "reactionaries" felt that much was left to be proved. It was the signal failure of pre war British tank policy in the Second World War - the inadequacies of British tank designs and tactics against the skilful panzer divisions - that added the venom to the debate. This thesis has been based on contemporary sources and the venom and the "if only they'd listened to me, Dunkirk wouldn't have happened" elements of post war writings is missing from the contemporary sources. In short, the policy of "slow and steady" was reasonable at the time but later events were to make people wish that there had been a more adventurous policy; the tank pioneers' policy of "full steam ahead" was quite impossible in the context but it is that policy that later reflection wished that there had been.

There is a curious symmetry in the tank controversy - one side was wrong for the right reasons and the other was right for the wrong reascns.

PAGE NUMBERING AS ORIGINAL

APPENDIX I

Tank Data

		DIMENSIONS				PERFORMANCE							ARMOUR		ARMAMENT		PRODUCTION HISTORY			
	CREW	LENGTH	HEIGHT	WIDTH	WEIGHT (TONS)	BHP	EFFECTIVE BHP	HP/TON	EFFECTIVE HP/TON	MAXIMUM ROAD SPEED	SPEED ON SOFT CLAY	RADIUS (MILES)	MAXIMUM (MM)	MINIMUM (MM)	MAIN	SECONDARY	TOTAL BUILT	DATES BUILT	PROTOTYPE APPEARED	MODEL ARRIVED RTC
MEDIUM D	3-4	30'	9'2½"	7'5"	14	240	160	17	11·4	23	11·4	200	10	6			3	1919-1924	1919	/
VICKERS MEDIUM MK I	5	17'6"	9'3"	9'1½"	11·7	90	60	7·7	5·1	15-30	5·1	120	6·25	6·25	1×3 PDR	4×HMG 2×VMG	30	1922	1922	1923
MK IA	"	"	8'10½"	"	11·9	"	"	7·6	5·0	"	5·0	"	8·0	"	"	"	50	1923	/	1923
MK IA*	"	"	9'10½"	"	12·1	"	"	7·4	"	"	"	"	"	"	"	3×VMG	?	?	/	?
MK II	"	"	8'10"	"	13·2	"	"	6·8	4·5	13-30	4·5	"	"	"	"	4×HMG 2×VMG	100	1925	1925	1925?
MK II*	"	"	10'	"	13·5	"	"	6·7	4·4	"	4·4	"	"	"	"	3×VMG	?	?	/	?
MK IIA	"	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	20	1930	/	1930?
MK II**	"	17'6"	8'10"	9'1½"	?	90	60	?	?	?	?	?	8·0	6·25	"	"	(44)	1932	/	1932?
MK IIACS	"	"	"	"	14	"	"	6·4	4·4	13-30	4·4	"	"	"	1×3·7" Howitzer	"	?	?	/	?
VICKERS MEDIUM MK III	7	21'6"	9'8"	8'10"	16	180	120	11·25	7·5	30	7·5	120	14	9	1×3 PDR	3×VMG	6	1929-1931	1929	1933
AIEI INDEPENDENT	8	24'11"	8'11"	8'9"	32	370	247	11·5	7·7	20	7·7	?	28	8	"	4×VMG	1	1926	1926	/
VICKERS-ARMSTRONG A	3	15'½"	6'9⅛"	7'11½"	8	87	58	10·9	7·3	22	7·3	100	13	5	/	2×VMG	?	1930	1930	/
SIX TON TANK B	"	"	7'	"	"	"	"	"	"	"	"	"	"	"	1×3 PDR	1×VMG	?	"	"	/
CARDEN-LOYD MK VI	2	8'1"	4-3'4"	5'7"	1·5	22·5	15	15	10	30	10	"	9	6	/	1×VMG or 1×·5in.	398	1928	1928	1928
VICKERS-ARMSTRONG LIGHT TANK MK I	"	13'2"	5'7"	6'1"	4·8	58	39	12·1	8·1	32	8·1	160	14	4	/	1×VMG	6	1930	1930	1930
MK II	"	11'8"	6'9"	6'1"	4·25	66	44	15·5	10	30	10	125	10	4	/	"	?	1930	1930	1931
MK III	"	11'10"	7'0"	"	4·5	"	"	14·7	9·8	"	9·8	150	"	"	/	"	36	?	1933?	?
MK IV	"	11'6"	7'1"	6'10"	4·3	88	59	20·5	13·7	36	13·7	125	12	"	/	"	?	?	1934?	?

Other AFVs Produced in the Period

1 Light Infantry Tank (Johnson) 1921
2 Vickers Light Tanks 1921
1 Vickers Medium C 1925?
8 Morris-Martel Two Man Tankettes 1927
8 Carden-Loyd Two Man Tankettes 1927
3 A7 Medium Tanks (Made by Woolwich Ordnance Factory - Work began 1929 and the design was finally abandoned in 1937)
1 wooden mock-up A8 (Vickers-Armstrong) 1933
6 different marks of Carden-Loyd Tankettes 1927-1930

Vickers Medium Mark I and Mark II Experimental Variants

1 Mark I Wheel and Track 1926
3 Birch Guns 1926-?
1 Mark II Bridgecarrier 1927/28
2 Mark II Females 1927
5 Mark II Tropical Tanks 1928
1 Mark II Box Tank 1928
4 Mark II* Specials 1929
1 Mark II Command Tank 1931

Between 1919 and 1934, 24 completely different tanks or tankettes were designed; counting the experimental variants, the number of tank and tankette versions is 39.

Sources:

Crow, D. (Ed): British Armoured Fighting Vehicles 1919-1940.
Ogorkiewicz, R.M.: Design and Development of Fighting Vehicles.

Notes:

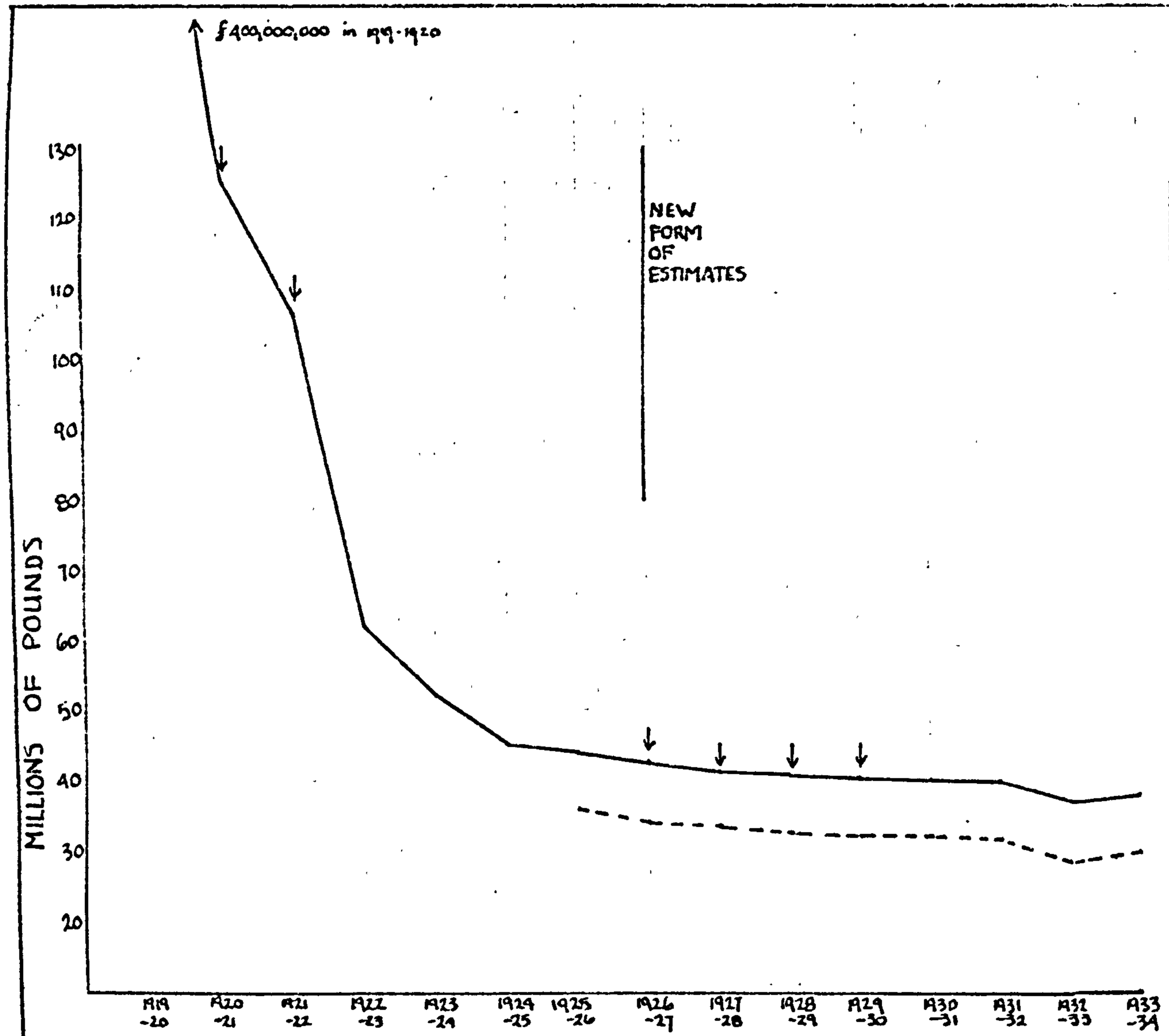
The figures for "Effective BHP", "Effective HP/Ton" and "Speed on Soft Clay" are based on calculations drawn from Ogorkiewicz, R.M.: Op. Cit.

30% to 40% of the gross horsepower of a tank is lost in "driving the cooling fans, in the transmission and elsewhere". (p. 87) I have taken 33 1/3% as the loss for these tanks. This is probably generous as the automotive parts of those tanks were not as good as they would now be and their suspensions contributed greatly to high friction.

"...a typical vehicle which needs 0.2 hp/ton per mph on concrete, requires 0.6 on sandy soils and as much as 1 hp/ton per mph on soft clay soils." (p. 103) It is nearly impossible to estimate the cross country performance of these vehicles today but, on the basis of a combination of the estimated net bhp and these figures I have attempted to estimate. Again, it is probably over generous to the tanks because these vehicles had narrow tracks and poor suspension units. It is likely, therefore, that over soft ground they would do even worse than I have suggested.

APPENDIX II

The Estimates



ARMY ESTIMATES 1919-1933
MONEY VOTED

——— ARMY ESTIMATES TOTAL

– – – – – EFFECTIVE SERVICES

↓ YEARS WITH SUPPLEMENTARY ESTIMATES

HUNDREDS OF THOUSANDS

200
190
180
170
160
150

TOTAL NUMBER
EXCLUSIVE OF INDIA

ARMY ESTIMATES 1919-1933
NUMBER OF MEN
VOTED
1. IN ARMY
2. IN R.T.C.

4500
4000
3500
3000
1500
1000

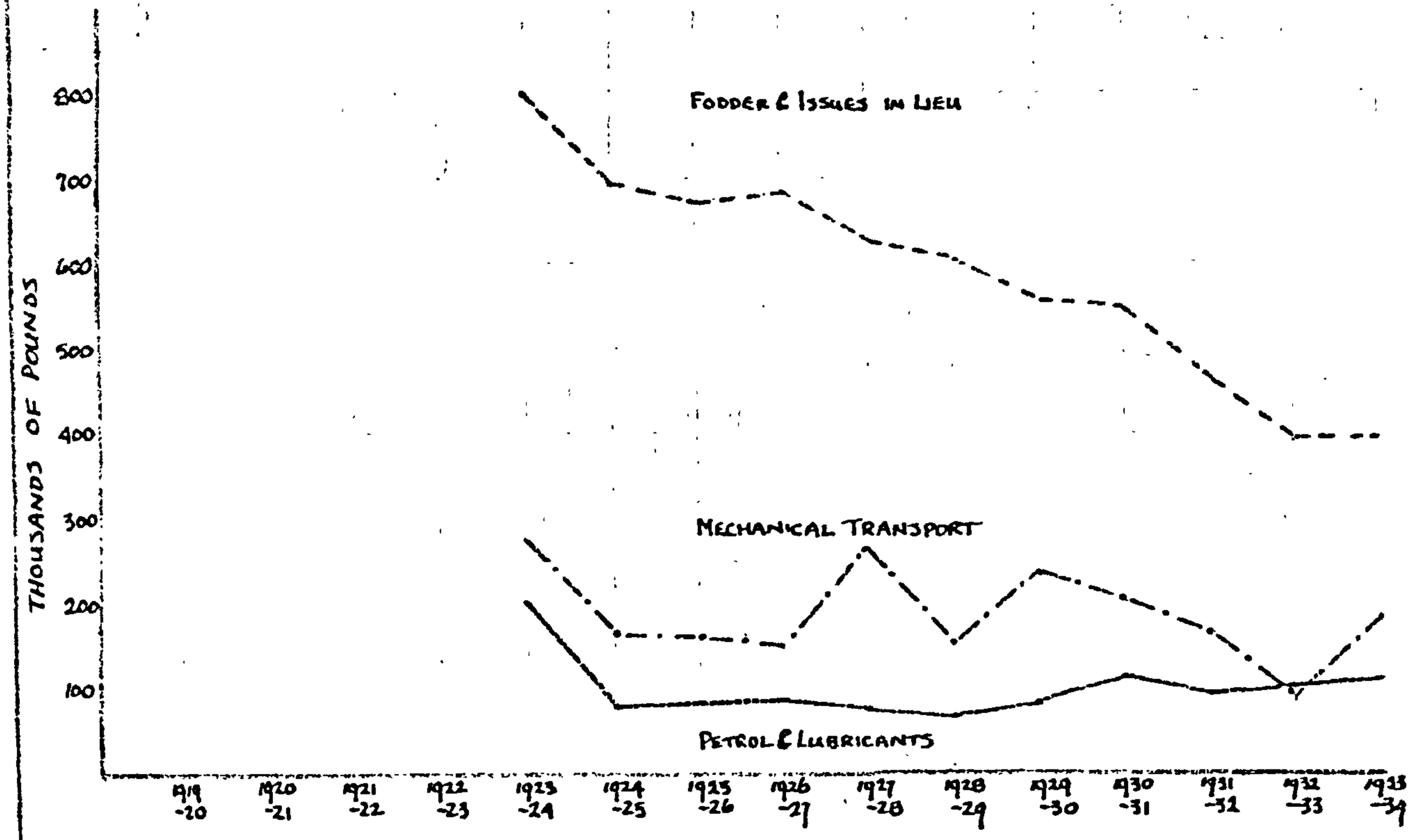
ROYAL TANK CORPS
EXCLUSIVE OF INDIA

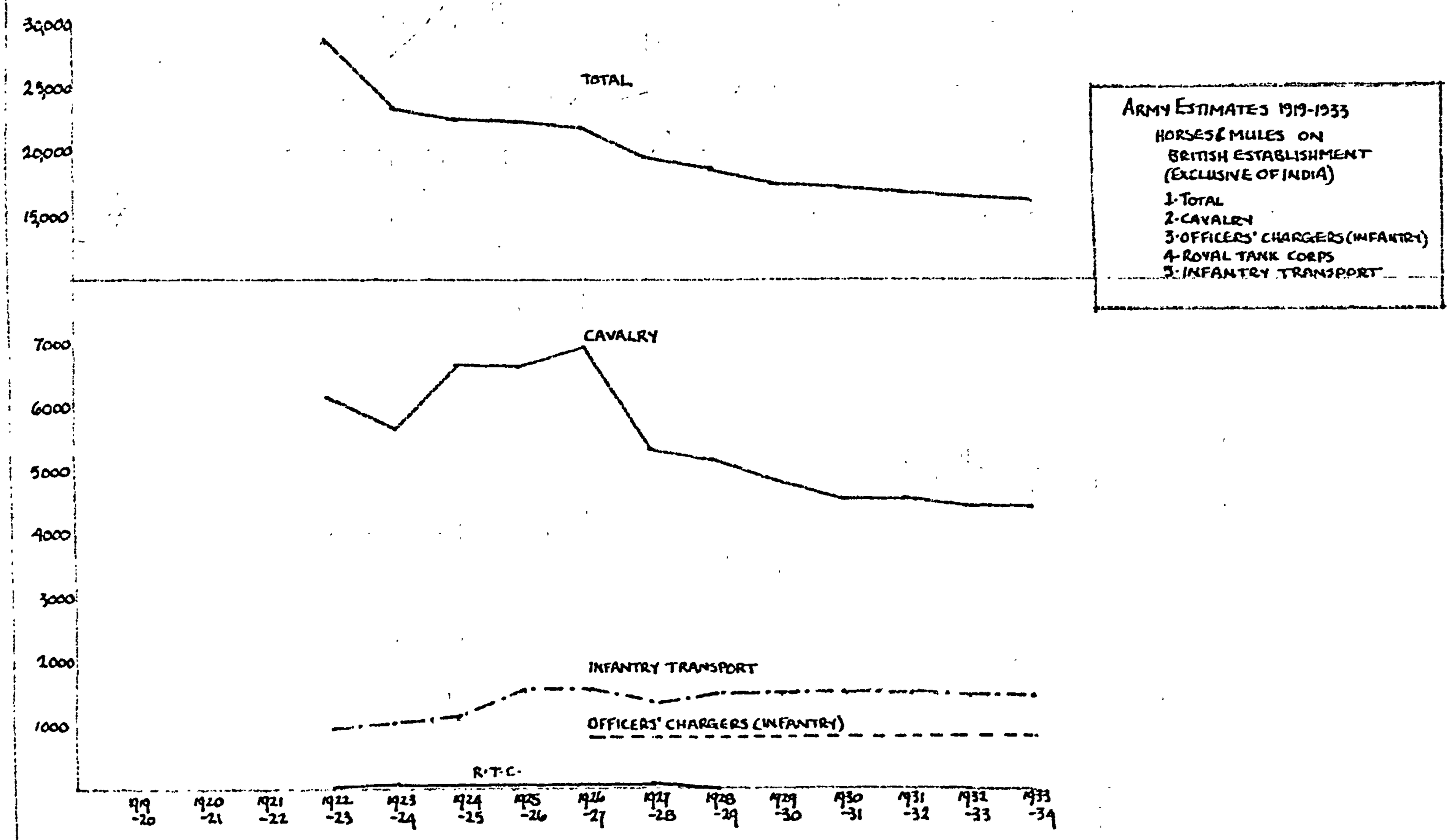
ROYAL TANK CORPS
IN INDIA

1919-20 1920-21 1921-22 1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32 1932-33 1933-34

Army Estimates 1919-1933

Estimates in Sterling
For
1. Fodder & Issues in Lieu
2. Petrol & Lubricants
3. Mechanical Transport





ARMY ESTIMATES 1919-1933

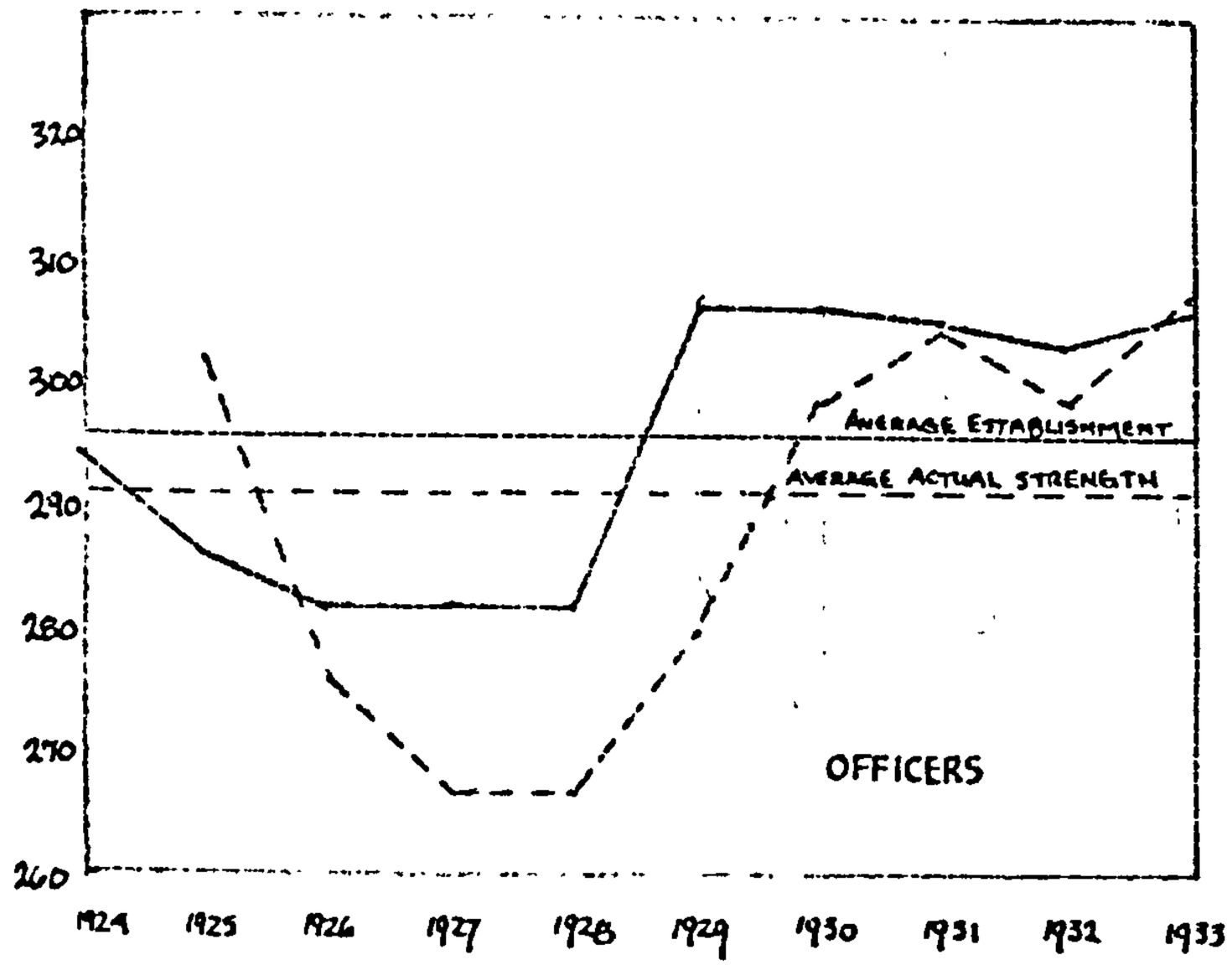
HORSES & MULES ON BRITISH ESTABLISHMENT (EXCLUSIVE OF INDIA)

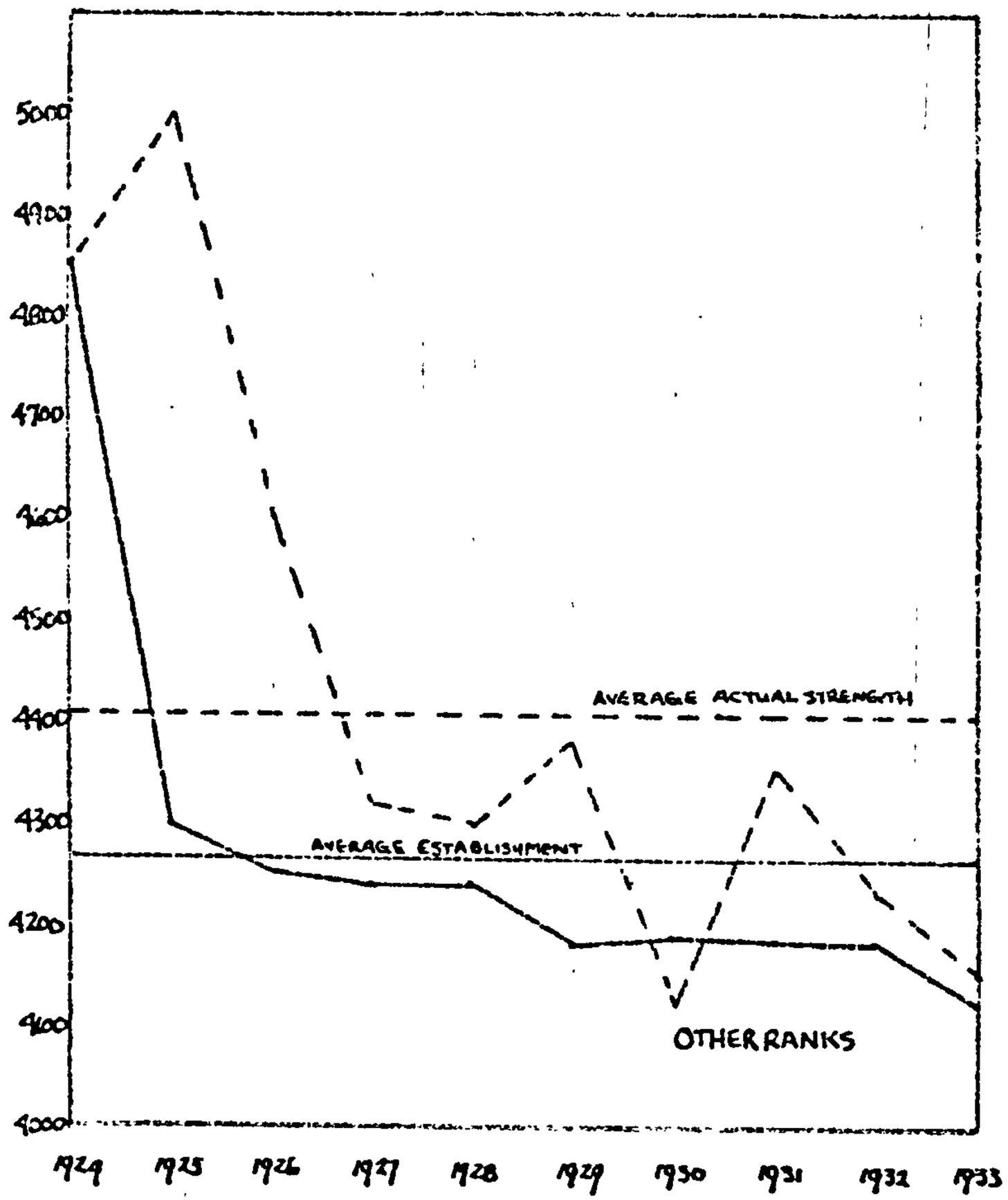
1. TOTAL
2. CAVALRY
3. OFFICERS' CHARGERS (INFANTRY)
4. ROYAL TANK CORPS
5. INFANTRY TRANSPORT

ARMY ESTIMATES 1919-1933
ESTABLISHMENTS & ACTUAL STRENGTH
ROYAL TANK CORPS

——— STRENGTH ON ESTABLISHMENT

– – – – ACTUAL STRENGTH





THOUSANDS OF POUNDS STERLING

40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280

1920-21
1921-22
1922-23
1923-24
1924-25
1925-26
1926-27
1927-28
1928-29
1929-30
1930-31
1931-32
1932-33
1933-34

ARMY ESTIMATES 1913-1933
PRODUCTION OF
TANKS
ARMOURED CARS
DRAGONS
&
SPARES
BY
ROYAL ORDNANCE FACTORIES
1. TOTAL PRODUCTION
2. PRODUCTION FOR REGULAR ARMY

------ TOTAL PRODUCTION

——— REGULAR ARMY

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Sources

The Army Estimates, published annually in Accounts and Papers, Air, Army.

Notes:

1. For the Estimates of 1926/27, the War Office reverted to a style of showing the costs which had been in use before the war. Consequently it is not possible to compare directly the Estimates before that year with those after as different costs came under different headings.

2. Until about 1924 the Army was using up its war time stocks of petrol, forage and mechanical transport and, therefore, accurate figures of these are not available for those years.

3. From 1921/22 to 1923/24 inclusive the Colonial Office reimbursed the War Office for expenses in the Middle East. The sums were 28,515,000, 4,930,000 and 553,000 Pounds respectively.

4. In several years there were Supplementary Estimates added to the Army Estimates either because the figures had been wrongly estimated or because of unexpected expenses like the Shanghai emergency in 1927. These have been indicated in the graphs.

APPENDIX III

The People

BROAD, Charles Noel Frank 1882-
Joined RA 1905; South African War, World War I; 1924 took charge of RTC Gunnery School; 1925 Chief Instructor RTC Central Schools; 1927 to War Office under DSD to plan war organization; 1931 ccmmanded Tank Brigade, autumn Brigadier General Staff Aldershot.
In 1933 he was a Brigadier and he ended his career as a Lieutenant General.

BURNETT-STUART, John Theodosius 1875-1958
Joined Infantry 1895; North-West Frontier, South African War, World War I; 1920 GOC Madras District; 1922 DMO&I; 1926 GOC 3rd Division; 1931 GOC Egypt.
In 1933 he was a Lieutenant General and he ended his career as a General.

COLLINS, Robert John 1880-1950
Joined Infantry 1897; South African War, World War I; 1919 Instructor at Camberly; 1924 DMT India; 1926 Colonel Commandant 9th Infantry Brigade; 1927 Colonel Commandant 7th Infantry Brigade and Experimental Forces; 1929 Commandant Small Arms School.
In 1933 he was a Major General and he ended his career with that rank.

FULLER, John Frederick Charles 1878-1966
Joined Infantry 1897; South African War, World War I; 1917 GSO1 Tank Corps; 1918 to War Office, 1923 a Chief Instructor at the Staff College; 1925 Military Assistant to the CIGS; 1926 Ceases position as Military Assistant and sent to India. When he returns is offered command of 7th Infantry Brigade and Experimental Mechanized Force; 1927 Writes out resignation in protest about the terms of his command, talked out of this and takes up position as GSO1 to 2nd Division; 1929 Commands 2nd Rhine Brigade and, later, 13th Infantry Brigade; 1930 Promoted and offered appointment in Bombay which he refuses; 1933 Retires from Army.
In 1933, upon retirement, he was a Major General.

HOBART, Percy Cleghorn Stanley 1885-1957
Joined RE 1904; North-West Frontier, World War I; 1921 Waziristan Force; 1923 Joined Tank Corps in India; 1927 On Collins' staff for Experimental Force, second in command of 4th Battalion RTC; 1930 To India as commander of Armoured Car Southern Group (4 companies); 1933 Inspector RTC and commander of 1st Brigade RTC.
In 1933 he was a Colonel and he ended his career as a Major General.

LIDDELL HART, Basil Henry 1895-1970
Joined Infantry 1914; World War I; 1917-1918 Wrote parts of the Infantry Manual; 1920 Begins writing, contacts Fuller; 1923 Applies for RTC but medical record prevents his application from being accepted; 1924 Placed on half pay list as a Captain because of health, in Summer made Assistant Military Correspondent for Morning Post. 1925

Full time Military Correspondent for Daily Telegraph, military advisor to 13th Edition of Encyclopaedia Britannica; 1927 Retires from Army; 1932 Makes "offensive weapons" proposal at Disarmament Conference, considered as Deputy to Hankey at CID but nothing comes of it; 1933 Assists with Kirke Committee Report.

LINDSAY, George Mackintosh 1880-1956
Joined RE Militia unit 1898; Joined Infantry in South Africa 1900; South African War, World War I; 1919 Commanding 41st Battalion MG Corps Germany; 1920 Staff College; 1921 Commanding Number 1 Armoured Car Group Iraq; 1923 Transfers to RTC, Chief Instructor RTC Central Schools; 1925 Inspector RTC; 1926-1929 Member of Mechanical Warfare Board; 1929 Brigadier General Staff Egypt; 1933 Ccmmanding 7th Infantry Brigade (partly mechanized).
In 1933 he was a Brigadier and he ended his career as a Major General.

MARTEL, Guy LeQuesne 1889-1958
Joined RE 1909; World War I; 1916 Sent to England from France to construct a practice ground for tank training and in September joins Headquarters in charge of tank units; 1918 Commanding a tank bridging battalion in England, develops "RE tank"; 1919 Develops numerous articles of bridging equipment adopted as standard until the war; 1920 Staff College; 1923 To War Office; 1925 Designs and builds the first light tank or tankette; 1927 Commands RE company in Experimental Mechanized Force; 1930 Instructor in mechanized war at Staff College, Quetta.
In 1933 he was a Lieutenant Colonel and ended his career as a Lieutenant General.

MILNE, George Francis 1866-1948
Joined Army in 1885; Sudan, South African War, World War I; 1919 GOC Constantinople; 1923 GOC in C in C Eastern Command; 1926 CIGS; 1928 Field Marshal; 1933 Retired as CIGS.

MONTGOMERY-MASSINGBERD, Archibald Armar 1971-1947
South African War, World War I; 1920 Deputy CGS India; 1922 GOC 53rd Welsh Division; 1923 GOC 1st Division; 1928 GOC in C Southern Command; 1931 Adjutant General; 1933 CIGS.
In 1933 he was a General and he ended his career as a Field Marshal.

PILE, Sir Frederick Alfred (Bart) 1884-
Joined RA 1904; World War I; 1927 Commanded reconnaissance battalion in Experimental Mechanized Force; 1928 Assistant Director of Mechanization; 1932 Commander Canal Brigade Egypt.
In 1933 he was a Brigadier and he ended his career as a General.

NOTES

1. For a full discussion of the continental commitment in Britain between the wars, see Howard, M.: The Continental Commitment.

1. Major General G.M. Harper the GOC 51st Division. As a result of his change of tactics, the division was unable to capture Flesquieres which held up the cavalry and spoiled the design of the battle. See Liddell Hart, B.H.: The Tanks, Vol. I, p. 141.

2. France and Belgium 1917, Vol. III
Liddell Hart, B.H.: History of the First World War, pp. 338-348
----------: The Tanks, Vol. I, pp. 128-153
Woolcombe, R.: The First Tank Battle: Cambrai 1917.
Fuller, J.F.C.: Tanks in the Great War, pp. 140-153.

3. France and Belgium 1918, Vol. IV, pp. 7-162
Canadian Official History, pp. 386-424
Australian Official History, Vol. VI, pp. 463-684
Liddell Hart, B.H.: History of the First World War, pp. 423-431
----------: The Tanks, Vol. I, pp. 177-186
Fuller, J.F.C.: The Decisive Battles of the Western World, Vol. II, pp. 365-388
----------: Tanks in the Great War, pp. 217-229.

4. Ludendorff: My War Memories, Vol. II, p. 679.

5. Middlebrock, M.: The First Day on the Somme for this and other 1 July 1916 statistics.

6. France and Belgium 1917, Vol. II, p. 124 to end. Total British casualties are given as 238,313. There has been some ccntroversy over the casualty figures given in the British Official History. (See Williams, M.J.: "Thirty Per Cent - A Study in Casualty Statistics", Journal of the Royal United Service Institution, 1964, p. 51 which criticizes the basis of calculation for the German figure given.) But, whether this figure is accurate or not, it may stand as at least the minimum as may that below.

7. France and Belgium 1916, Vol. I, p. 246 to end and Vol. II. Total casualties given as 419,654.

8. Australian Corps casualties 8 August 1918 - 83 killed, 78 missing and 491 wounded. Australian Official History, Vol. VI, p. 684.

9. Canadian Official History, p. 508. Total casualties 684 of which 310 were fatal.

10. Fuller, J.F.C.: Machine Warfare, p. 41.

11. "Notes on a Memorandum of Sir Eustace d'Eyncourt proposing Tank Armies", 28 December 1917, PRO/WO32/5933.

12. Precis 866, Army Council Meeting 214, 25 June 1917, PRO/WO163/22.

13. Elles, Col. Cmdt. Sir Hugh: "Some Notes on Tank Development During the War", Army Quarterly, Vol. 11, p. 267, July 1921 (Reprinted Tank Corps Journal, Vol. 3, February and March 1922).

14. France and Belgium 1917, Vol. III, p. 90, n. 1. Fuller, J.F.C.: Tanks in the Great War, p. 146. Fuller does not give the casualties.

15. France and Belgium 1918, Vol. IV, p. 156. Fuller, J.F.C.: Op. Cit., pp. 223-226.

16. France and Belgium 1917, Vol. III, p. 90, n. 1.

17. Fuller, J.F.C.: Op. Cit. Of the total of 688 tanks which saw action in the battle, 480 (69.77%) were handed over to Salvage and all of the remainder required a "thorough overhaul". (p. 227.)

18. "The designers <of the original tank> indeed claim that they were verbally instructed that the tank should 'run 50 miles and might then fall to pieces'". Elles, Col. Cmdt. Sir Hugh; Art. Cit.

19. Elles, Col. Cmdt. Sir Hugh: Art. Cit.

20. The "Gunner of Flesquieres" became quite a legend in later years to people concerned to prove that tanks could not live in the face of guns. Haig sent a despatch about Cambrai which read, in part, "Many of the hits upon our tanks at Flesquieres were obtained by a German artillery officer who, remaining alone at his battery, served a field gun single-handed until killed at his gun". In Conan Doyle's histcry cf the war, this brave officer was credited with destroying 16 tanks. (Liddell Hart, B.H.: The Tanks, Vcl I, p. 142) In 1933, Major Hotblack (Intelligence Officer to the Tank Corps in 1917) gave it as his opinicn that the matter was very doubtful. The Germans themselves had looked for traces of this officer after the war but had been unable to turn anything up and Hotblack, who actually saw the destroyed tanks afterwards, was sure that they had been destroyed by a battery. (Hotblack, F.E.: "A Cambrai Myth?", Royal Tank Corps Journal, Vol. 14, p. 285, March 1933) A later assessment, which is free from partisanship in the matter, authoritatively gives the facts of the case as follows. The German 54th Division garrisoning Flesquieres was commanded by Lieut. Gen. F. Von Watter who had made a special study of anti-tank gunnery and had practiced his gun crews. He expected a tank attack and his guns were fully prepared when it came. The tank tactics used at the Ridge had been modified by General Harper so that the tanks were unprotected by infantry. As they came slowly over the Ridge, they were perfect targets and the German gunners were able to hit perhaps forty of them. (Woolcombe, R.: The First Tank Battle: Cambrai 1917, pp. 104-117) It seems therefore, that Haig's mysterious gunner

was a whole battery.

21. "Anti Tank Defence", Royal Tank Corps Journal, Vol. 6, September and October 1924.

22. Ibid.

23. Browne, Capt. D.G.: The Tank in Action, pp. 163-176. He estimated that one shell per minute fell near his tank and neither the tank nor any of the crew was hit once.

24. Browne, Capt. D.G.: Ibid., pp. 237-238. The British thought that the tank had been captured by the Germans and began to fire at it; the Germans knew it hadn't and they also fired at it. Meanwhile the tank was able to keep up a fire on the Germans "killing or wounding a great number of the enemy". This took place between 22 and 24 October 1917.

25. Browne, Capt D.G.: Ibid., p. 479. This happened on 30 September 1918 to his tank and it was a 5.9 inch (sic) shell.

26. Jones, Rarey and Icks: The Fighting Tanks 1916-1933, p. 22.

27. The Germans developed an anti-tank rifle of 13mm calibre; it could penetrate half inch armour (12.7mm) at 400 metres but it was heavy and unpopular with the troops. This rifle was to have been superseded by a machine gun with similiar characteristics. It was planned to build 6000 by April 1919 with the first deliveries in December 1918. Its manufacture was to take priority over submarines and aircraft. It was of course too late but its effect would have been considerable as it could easily have penetrated any French or British armour. (Browne, Capt. D.G.; Op. Cit., pp. 299-300).

28. Quoted in Sixsmith, E.K.G.: British Generalship in the Twentieth Century, p. 128.

29. One "lesson of the war" that was rather overdone by the Tank Corps in later years concerned the adventures of "Musical Box" on 8 August 1918. "Musical Box" was the nickname of a Whippet tank of B Company, 6th Tank Battalion commanded by Lieut. C.B. Arnold. The tank passed through the Australians and came upon a battery firing on two Mark Vs; Arnold attacked the gunners and killed them. "Musical Box" then moved around the battlefield giving assistance to parties of infantry and cavalry. It continued east, by now far in front of the other troops, and shot up parties of Germans for about an hour. By now the crew was in considerable discomfort from exhaustion and bullet splash but they pressed on and attacked a supply column. In the resulting fight "Musical Box" was finally put out of action but its guns killed and wounded many more Germans. The crew eventually

surrendered and one man was killed but the other two survived to return from a POW camp after the Armistice. "Musical Box" had fought its lone war about ten miles from its start line without any assistance from other soldiers. (Liddell Hart, B.H.: The Tanks, Vol. I, p. 182). To the tank enthusiasts this was proof:

> The confusion caused by these 12 armoured cars <a group of armoured cars had also broken into the German rear areas but without such spectacular results> and one Whippet tank was phenomenal, and should it be multiplied by the number of Whippets which took the field on the 8th <96>, it is prcbably no exaggeration to assume that, had they been concentrated around Chaulnes, they would have ruined the whole German command and administration...<on>...a front of some 50 miles. (Fuller, J.F.C.: The Decisive Battles of the Western World, Vol. II, p. 381).

The reason why this did not happen, according to Fuller, was that the Whippets were linked to the cavalry and the two forces made unequal progress. Perhaps Fuller is being a little hopeful here - the other 95 Whippets had had the same chance as "Musical Box". In any case, one instance is a slender peg on which to hang a "lesson of the war".

30. It is depressing to wonder what else could have been done with the 50 million Pounds squandered to no end in Russia. (Figure of 10,810,000 Pounds on military services and 40,000,000 Pounds on material given to the Russians from Higham, R.: Armed Forces in Peacetime, p. 33).

31. For these and other figures from the Army Estimates, see Appendix II.

32. An appendix to Precis 1074, PRO/WO163/26, p. 11, outlines the Treasury Memorandum.

33. W.L.S. Churchill was Secretary of State for War and Air from January 1919 until January 1921.

34. The need for economy was stressed at Army Council Meeting 274, 6 December 1920 and the figures were given at Meeting 275, 21 December 1920, PRO/WO163/25.

35. Worthington-Evans thought that this reduction could be made without affecting the fighting strength of the Army but that further reductions would require a reorganization of the Army; he expected that the Army would have "to go further on the path of reduction". Worthington-Evans' report is contained in Precis 1056 (19 February 1921) and it was considered at Army Council Meeting 276, 21 February 1921, PRO/WO163/26.

36. Sir Laming Worthington-Evans succeeded Churchill and

remained at the War Office until October 1922 and again from November 1924 until June 1929.

37. Precis 1073 and Army Council Meeting 280, 25 May 1921, PRO/WO163/21.

38. Worthington-Evans' report is in Precis 1074 (he called the economic position "a grave one"). Army Council Meeting 281, 2 June 1921, PRO/WO 163/26.

39. Lord Derby from October 1922 until January 1924.

40. Precis 1120 and Army Council Meeting 309, 21 November 1922, PRO/WO163/28.

41. Army Council Meeting 330, 13 February 1924, PRO/WO 163/30.

42. Eric Campbell Geddes had much experience of reorganization: general manager designate of the North Eastern Railway, he directed railway transport and naval supply during the war. He was Minister of Transport from 1919 to 1922. (Taylor, A.J.P.: English History 1914-1945, p. 124 n.1).

43. Sir Robert Horne, House of Commons Debates, Vol. 151, Col. 427, 1 March 1922. He was hopeful of cutting 1922/1923 expenditure by 181 million Pounds.

44. One cavalry and six infantry divisions.

45. Both questions and answers are in Precis 1082, PRO/WO163/26, p. 196.

46. All that the Tank Corps had at this time was 36 Medium C tanks and an unknown number of rhomboids and Whippets from war stocks. The Medium C was an improvement on the Whippet but had similiar specifications (8mph, 12mm armour, 4 machine guns). It was patently obsolete. Experiments with Johnson's tank designs had gone awry and the Vickers Medium was still in the prototype stage.

47. Fuller says that Sir Henry Wilson, when CIGS, was fond of asking the question: "Why do we have six divisions in our funny little army?" And answering it: "Nobody knows and nobody cares!" (Fuller, J.F.C.: Memoirs of an Unconventional Soldier, p. 365). Wilson was being sarcastic but the fact that he thought he could make a joke about the subject is significant. The Cardwell System was retained because no one could think of any other means of providing the necessary overseas garrisons. See below Notes 77 and 81.

48. The May Committee was of the opinion that the budget was unbalanced and the gap must be bridged. There were two ways to cover the deficit: retrenchment or increased taxation and the majority of the Committee favoured the

first. The object of the reductions was "to restore international faith in Sterling and British credit". The Labour government accepted the recommended cuts but added temporary cuts of two million Pounds each for the Navy and the Army ond one million Pounds for the Air Force. The National Cabinet wanted all over government cuts of 70 million Pounds. (PRO/CAB21/349).

49. Most of it came from a 10% pay reduction. Considering the deflationary aspects of the Great Depression, this was probably not the hardship that it might have been. The reductions were taken "in the Spirit of 1914". (Duff Cooper, House of Commons Debates, Vol. 262, Col. 1651, 8 March 1932).

50. For example, Territorial Army and Territorial Reserve camps were suspended to save 940,000 Pounds; replacement of horses, Motor Transport and New Services were delayed or reduced to save 217,000 Pounds.

51. Precis 1357, 1 September 1931, PRO/WO163/37, p. 73 contains the proposals and the Army Council's actions. The meetings at which the reductions were considered were 373, 31 August; 374, 2 September; 375, 17 September and 376, 25 September 1931. PRO/WO163/37.

52. The argument that the Ten Year Rule was to blame for almost everything is put forth by Peter Silverman in the March 1971 issue of the Journal of the Royal United Service Institution and, in my opinion, well refuted by K. Booth in the September 1971 issue of that Journal.

53. Meeting of the Cabinet Committee on Finance, 11 August 1919, Conclusion 7 quoted in PRO/WO32/9314. (See Note 55 below for an explanation of this document.)

54. Meeting of the War Cabinet 616A, 15 August 1919, PRO/CAB23/15.

55. Hankey gave this opinion on 14 December 1923 in a letter to E.B.B. Speed in answer to the latter's question about the origin of a "dictum of the Cabinet to the effect that there would be no war for ten years". (PRO/WO32/9314) This document is the first of three which Hankey wrote explaining the origin of the principle. It was prepared for the information of the War Office which apparently had noticed a mention of the rule in the Geddes Report of 1921. In July 1928 he prepared a history of the principle of no great war for ten years for the CID as background to assist it in its consideration of Churchill's proposals. (CID Paper 892-B) In June 1931 he brought that paper up to date for the CID in light of the COS Subcommittee's proposals. (CID Paper 1055-B)

56. CID Meeting 199, 2 April 1925, PRO/CAB2/4. At its previous meeting the CID had accepted the Foreign Secretary's proposal but it was slightly expanded in

discussion at the April meeting.

57. Cabinet Meeting 57(25) 3 December 1925, PRO/CAB23/51. It was postponed again until 1938 by the Cabinet on 11 December 1929. (Cabinet Meeting 52(29) PRO/CAB23/62)

58. Cabinet Meeting 45(27) 28 July 1927, PRO/CAB23/55. The Secretary of State for War had asked the CID in July 1927 to renew the 1919 War Cabinet decision but "great pressure of business" had prevented the Committee from doing so. (CID Paper 873-B) The CID took note of the Cabinet decision at Meeting 235, 22 May 1928. (PRO/CAB2/5)

59. CID Paper 891-B, June 1928; quoted in CID Paper 1055-B

60. CID Meeting 236, 5 July 1928, PRO/CAB2/5.

61. CID Meeting 243, 27 July 1929, PRO/CAB2/5. This meeting provides a question in the otherwise straightforward history cf the "Ten Year Rule". Both Snowden (Chancellor of the Exchequer) and MacDonald (Prime Minister) referred to a non moving rule which, they claimed, had been passed in 1921 referring to the chance of a great war before 1931. There does not seem to be any record of such a decision - the only thing that they could have been thinking of was the reference to the 1919 decision which was published in the Geddes Report in 1921. In none of his accounts does Hankey make any reference to a 1921 decision.

62. CID Meeting 249, 14 July 1930, PRO/CAB2/5.

63. CID Meeting 253, 29 June 1931, PRO/CAB2/5. MacDonald observed that "the present assumption that there would be no major war for ten years had been acted upon in one form or another by almost all governments since the War". An observation that is surely correct.

The Foreign Office placed a memorandum before the Committee which stated that the rule must be re examined "in the light of developments in 1932 on which so much must depend". The CID agreed to do this.

64. CID Meeting 255, 22 March 1932, PRO/CAB2/5. Almost everyone present at the meeting spoke against the continuance of the rule. Sir John Simon (Foreign Secretary) supported by Vansittart (his Permanent Under Secretary) stated the the "general view of the Foreign Office, which they reached with regret, was that the Ten Year assumption was a dangerous one". Sir Bolton Eyres-Monsell (First Lord of the Admiralty) said that it was "impossible to allow the assumption to continue indefinitely from day to day" and that he thought the country would be "horrified" if it were to find out that the rule continued to be the basis of defence

preparations. Lord Hailsham (Secretary of State for War) agreed that "in present circumstances <it was> impossible to continue working on the Ten Year assumption".

The COS Subcommittee Report gives an earlier version of the Silverman thesis in that it blames virtually all of Britain's defence weaknesses on the "Ten Year Rule". (CID Paper 1082-B, 23 February 1932)

65. Cabinet Meeting 19(32) 23 March 1932, PRO/CAB23/70. The rider about bearing the economic and financial situation in mind echoed a Treasury note to the COS report which said, in part:

> For some years past, and at the present time more than ever, the position and future of this country depend on the recovery and maintenance of sound finances and a healthy trading position.
> ...the Treasury submit that at the present time financial risks are greater than any other that we can estimate... (CID Paper 1087-B, 11 March 1932)

Roskill arques that the Cabinet did not in fact cancel the "Ten Year Rule" until 15 November 1932 (Cabinet Meeting 62(33) PRO/CAB23/77) when it accepted a CID recommendation that a COS recommendation concerning the preparation of a defence programme be accepted. It seems that this point depends on one's interpretation of the rather peculiar formula in the Cabinet Minutes used in 1932 - "No dissent was expressed from the acceptance of the Committee of Imperial Defence of the recommendation of the Chiefs of Staff Sub Committee in favour of the cancellation of the assumption on which the Estimates of the Defence Departments have been based in recent years." If this does not mean that the Cabinet accepted the cancellation of the "Ten Year Rule", what does it mean? (Roskill's argument is given in "The Ten Year Rule - The Historical Facts", Journal of the Royal United Service Institution, 1972, p. 69.)

66. Barron, Lieut. Col. F.W.: "The New Responsibilities of the British Empire Created by the Assumption of Mandates in the Middle East and Their Strategic Significance with Specific Reference to the Defence of India", (Lecture RUSI, 8 March 1922), Journal of the Royal United Service Institution, 1922, p. 255. Barron was on the General Staff in the department dealing with the Middle East.

67. This amounted to something in excess of 200,000 square miles - more than twice the size of the United Kingdom.

68. Barron, Lieut. Col. F.W.: ~~Art.~~ Cit.

69. "The Present Distribution and Strength of the British

Army in Relation to its Duties", PRO/WO32/2823.

70. General the Earl of Cavan was CIGS from February 1922 until February 1926.

71. Great Britain: 9 cavalry regiments; 53 infantry battalions; 17 1/3 artillery brigades; 3 2/3 tank battalions; 2 armoured car companies
Ireland: 5 infantry battalions; 1/4 artillery brigade
Rhine: 1 cavalry regiment; 8 infantry battalions; 3 artillery brigades; 1/3 tank battalion
Constantinople: 1 cavalry regiment; 13 infantry battalions; 1 3/4 artillery brigades
Egypt: 3 cavalry regiments; 6 infantry battalions; 1 artillery brigade; 1 armoured car company
Iraq: 2 infantry battalions; 1/4 artillery brigade
Colonies: 3 British infantry battalions and 3 Native infantry battalions
To confuse matters, the Estimates treat India separately so that I do not have exact figures except for the RTC which had 6 armoured car companies and a Tank Corps Centre. Under the Cardwell System, however, India would have had roughly the same number of cavalry and infantry units as were at home.

72. The units required were:
India: 8 cavalry brigades and 6 infantry divisions
Iraq: 2 cavalry brigades and 2 infantry divisions
Palestine: 1 cavalry brigade and 1 infantry division
Egypt: 1 cavalry brigade and 2 infantry divisions
Constantinople: 2 infantry divisions
The Occupied Zone of the Rhineland was confidently expected to require no reinforcements. The Report stressed that these reinforcement scales were for local hostilities only. The requirements for more serious hostilities are not given.

73. National and Imperial Defence; Proceedings of Subcommittee (CID), File registered 14.3.23, PRO/CAB21/260. This document is also the source for Notes 71 and 72.

74. Precis 1296 representing a discussion by the Military Members of the Army Council on 22 June 1927, PRO/WO163/33, p. 234. It was considered at Army Council Meeting 358, 8 July 1927.

75. General (later Field Marshal) Sir George Milne was CIGS from February 1926 until February 1933.

76. PRO/WO32/2823.

77. "This review <Review of Imperial Defence, 1926, by COS Sub-Committee> went on to explain that the size of the regular army was regulated by a system which demanded an approximate equilibrium between the number of units maintained overseas and the number maintained at home.

Consequently the Expeditionary Force in England is merely a by-product of this system, being organized from the units on the home establishment, from which sources have also to be supplied such regular units as may be required for home defence."

78. "In 1914 the Expeditionary Force, whose strength was regulated by the same factors <as described in Note 77>, was stronger by 1 division than it is today, yet it mobilized in under one month instead of the five now necessary." And "...a comparison of our foreign garrisons today with the strengths at which they stood in 1914, shows that in nearly every case, they have been reduced".

79. "...when trouble broke out on a large scale at the beginning of this year, we were compelled to send to the Far East reinforcements totalling 17 battalions". This would have been a quarter to a third of the home establishment.

80. "Apart from the somewhat indefinite liability which we have assumed under the Locarno Pact, the chief military liability of the British Empire appears to be the defence of India against Russian aggression. A recent study of this question by a Sub-Committee of the CID has enabled us to arrive at the strength of the force which we, so far as can be calculated befcrehand, shall have to send out to India during the first twelve months of such a war. This force would amount to the equivalent of 11 divisions which is more than twice the strength of the force which can today be organized cut of the regular units in England".

81. "It is not considered that any further reduction can be made in the number of regiments abroad; the home establishments, which have been considerably reduced during the current year, are controlled by the drafts required to maintain the regiments on foreign service, and by the number of units required for the Expeditionary Force".

82. "The Present Distribution and Strength of the British Army in Relation to its Duties", General Staff, 1 November 1927, PRO/WO32/2823. Notes 77, 78, 79, 80 and 81 are also from this document.

83. So different were the war time tanks from the post war tanks that it may even be said that the tank proper, as we know it today, is a post war invention. The rhomboids were so slow that they can hardly be said to have been anything other than self propelled pillboxes. Further, the tactical and strategic roles of the war time tanks were so limited in comparison to those of today's tanks or even those of the Vickers Medium that they would not be considered tanks by a modern definition. Perhaps the Vickers Medium (or even the Medium D) should be considered the first true tank.

1. "Mechanicalization" was the term used until it was replaced by "mechanization" from about 1927.

2. Dundas, Lieut. Col. J.C.: "A New Road to Economy in the Army", Tank Corps Journal, Vol. 3, p. 283, March 1922. His final conclusions were that a cavalry regiment was worth .45 of an "equivalent mechanized cavalry regiment"; a field artillery brigade worth .88 of an "equivalent mechanized unit"; an infantry battalion worth .40 of an "equivalent mechanized unit".

3. Grove-White, Bt. Maj. M.FitzG.: "Machinery or Muscle", Cavalry Journal, 1922, p. 307. A tank battalion equipped with a "battle tank" would cost 270,480 Pounds; one equipped with a "medium tank" 99,240 Pounds; one with a "scout tank" 39,648 Pounds. Since none of these types actually existed he had to make certain assumptions about them which are of interest to us in that machine guns were assumed to be the armament for all types with the addition of a 6 pounder to the "battle tank".

4. Martel, G.LeQ.: "Small Tanks and Cavalry", Cavalry Journal, 1927, p. 437. The "artillery tankettes" were to have armour piercing machine guns.

5. Fuller, J.F.C.: "The Application of Recent Developments in Mechanicalization and other Scientific Knowledge to Preparation and Training for Future War on Land", Gold Medal (Military) Prize Essay for 1919, Journal of the Royal United Service Institution, 1920, p. 239.

6. ----------: "Tanks in Future Warfare", Tank Corps Journal, Vol. 3, October, November and December 1921. He had made the point about mechanization acting to reduce distance earlier. His argument was that if one could travel twice as fast, territory would be effectively halved; therefore a detachment could get to a scene of trouble twice as fast as it could have before and therefore could be stationed twice as far away enabling a reduction in manpower through the increase in territory that a given detachment would be able to patrol. (see "The Introduction of Mechanical War on Land and its Possibilities in the Near Future", Lecture at SME Chatham, 11 November 1920, Royal Engineers Journal, Vol. XXXIII, p. 1, January 1921).

7. See Chapter 2.

8. ----------: "The Tank - Ten Little Pictures", Tank Corps Journal, Vol. 3, p. 226, January 1922.

9. Martel, G.LeQ: "Mechanization", Army Quarterly, Vol. XIII, p. 291, January 1927.

10. Burnett-Stuart, Maj. Gen. Sir John: "The Progress of Mechanization", Army Quarterly, Vol. XVI, p. 30, April 1928. This article is the text of a lecture

delivered at the University of London on 8 March 1928. This is the sole evidence (and it isn't much to go on) I have been able to turn up of any interest in the general public on the mechanization question. It was probably not a coincidence that it was given just after the Experimental Mechanized Force exercises in 1927.

Lindsay thought in 1928 that the prestige of the RTC in the universities seemed to be high. Report on Training of the RTC During 1928, Liddell Hart Archives, Lindsay Papers 15/12/6.

11. Rt. Hon. J.I. MacPherson, House of Commons Debates, Vol. 170, Col. 2634, 13 March 1924 and Lieut. Col. L. Ward, Ibid., Vol. 171, Col. 99,, 24 March 1924.

12. Stephen Walsh had been the Labour Secretary of State for War frcm January to November 1924.

13. Ibid., Vol. 181, Col. 1895, 16 March 1925.

14. Rt. Hon. J.I. MacPherson, Ibid., Vol. 181, Col. 1901, 16 March 1925.

15. J. Beckett, Ibid., Vol. 225, Col. 2239, 28 February 1929. It is interesting that the anti military faction in Parliament tended to support mechanization: to them it was simply a means of saving the money which they wanted to see spent on other things.

16. W. Wellock, Ibid., Vol. 225, Col. 2278, 28 February 1929. Aqain we see this peculiar relationship of tne anti military and mechanization - Wellock was speaking on behalf of an amendment calling for British disarmament. He was arguing that, since the Army was now so much more efficient, Britain was, in fact, increasing her armaments despite the reduction in money spent.

17. The War Ministers of all parties were fond of prefacing the latest announcement of Army cuts with a statement that never before had the Army been so powerful.

18. Rt. Hon. Sir Laming Worthington-Evans, Ibid., Vol. 139, Col. 1288, 15 March 1921.

19. Lord Derby was Secretary of State for War from October 1922 until January 1924.

20. Memorandum of the Secretary of State for War, Army Estimates for 1922-1923.

21. The Earl of Midleton had expressed concern about the small size of the Army, bolstering his argument by saying that a private in 1914 had cost the Army 76 Pounds a year and that by 1923 the cost had risen to 200 Pounds but that the Estimates had not been increased to match. House of Lords Debates, Vol. 54, Cols. 620-636, 27 June 1923.

22. The Earl of Onslow had asked the question and it was answered by the Earl de la Warr who was Undersecretary of State for War. Ibid., Vol. 76, Cols. 946-958, 20 March 1930.

23. Sometimes embarrassing questions were asked in Parliament, however. On 17 March 1931 Brig. H. Clifton Brown asked for details of costs of mechanized units as compared with unmechanized ones. He was given no answer. He then said that the House had been promised that mechanization would produce economies and when was it to be given the figures of the savings? He got no answer to that either. House of Commons Debates, Vol 249, Col. 1863.

24. Pile, Lieut. Col. F.A.: "The Problem of the Tank", (Lecture RA Institute, 18 November 1924), Journal of the Royal Artillery, Vol. LII, p. 217, 1925/1926. Of some interest is Pile's opinion, given here, that at this time the French Army was in the lead in the design of tanks and in their use.

25. Many assumptions underlay this confidence that tanks would in the future be as economical as they had been in the past. Two of them were a conviction that the British would retain their supposed lead in tanks indefinitely and that tanks would seldom have to fight tanks.

26. Germains, V.W.: "The Mechanization of Fleets and Armies", Royal Engineers Journal, Vol. XLIII, p. 50, March 1929 and "The Limitations of the Tank", Journal of the Royal United Service Institution, 1930, p. 124.

27. For example the early stages of Alamein, the battle of the Kursk Salient, the battle of Caen and many of the actions in Italy.

28. Fuller, J.F.C.: "Tanks in Future Warfare", Tank Corps Journal, Vol. 3, October, November and December 1921.

29. ----------: Gold Medal (Military) Prize Essay for 1919, Journal of the Royal United Service Institution, 1920, p. 239.

30. ----------: "The Influence of Tanks on Cavalry Tactics", Part 3, Cavalry Journal, 1920, p. 510.

31. "Views of Marechal Foch on Mechanization", (1927), PRO/WO32/2824.

32. "Report on the Lessons from the Military Operations in Gallipoli", Lieut. Gen. W.M.StG. Kirke, PRO/WO32/3116.

33. Milne, Gen. Sir George: Speech to the senior officers in the Experimental Mechanized Force, 8 September 1927, Liddell Hart Archives, 11/1927/7.

34. In fact this was not true until the appearance of light tanks and tankettes in the late 1920's. Over short distances cavalry was considerably faster than the Vickers Medium; over long distances, the Vickers Medium tended to break down.

35. Howard, Maj. W.J.H.: "Tanks and Infantry Cooperation", (Lecture to 1st Guards Brigade, 16 March 1926), Royal Tank Corps Journal, Vol. 8, p. 42, May 1926. All weapons systems, including a man with a stick, can attack, defend themselves and move.

36. Howard, Col. T.S.M.: "The Necessity for a Reorganization of the Infantry on Broad Lines", (First published in Fighting Forces) Royal Tank Corps Journal, Vol. 10, p. 11, May 1928.

37. Liddell Hart, B.H.: "Armoured Forces in 1928", Journal of the Royal United Service Institution, 1928, p. 720. This sort of article always assumed that the infantry was unarmed; when the infantry got more and better anti-tank guns, the tanks stopped having everything their way.

38. Fuller, J.F.C.: "The Tactics of the Attack as Affected by the Speed and Circuit of the Medium D Tank", KCL Archives, FUL/P/TS/50. This paper is undated but it is obviously an early version of Plan 1919 and therefore presumably written in 1918.

39. "Some General Principles of Imperial Defence", March 1928, PRO/CAB21/315.

40. House of Commons Debates, Vol. 170, Col. 2690, 13 March 1924.

41. "Report on the Mesopotamia Campaign", Maj. Gen. B.D. Fisher, PRO/WO32/3116.

42. Report of the Committee on the Lessons of the Great War. October 1932, p. 29, PRO/WO32/3116. Liddell Hart called the Report "excellent". Diary Entry for 11 September 1933, Liddell Hart Archives 11/1933/1.

43. Ibid., p. 29.

44. PRO/WO32/5959, unsigned and undated memorandum, the file is entitled "Proposed Reductions in Cavalry Regiments", registered 24.2.21.

45. 3 November 1927, PRO/WO32/2846.

46. Wavell, Brig. A.P.: "The Army and the Prophets", Journal of the Royal United Service Institution, 1930, p. 665.

47. Meetings Nos. 6 and 7, 11 and 12 October 1926,

Cavalry Committee, KCL Archives, Montgomery-Massingberd Papers, 157.

48. Pitman, Maj. Gen. T.T.: "Back to the Chariot", Cavalry Journal, 1928, p. 306.

49. House of Commons Debates, Vol. 139, Col. 1302.

50. Ibid., Vol. 170, Col. 2699.

51. Jackson, Maj. Gen. Sir Louis: "Possibilities of the Next War", (Lecture RUSI, 17 December 1919), Journal of the Royal United Service Institution, 1920, p. 71.

52. Martel, G.LeQ.: "A Tank Army", KCL Archives, Fuller Papers, P/TS/9. Martel in his autobiography says that this was written in November 1916, Fuller remembers it as having been written in March 1917.

53. Discussion following Croft, Lieut. Col. W.D.:"The Influence of Tanks upon Tactics", (Lecture RUSI, 7 December 1921), Journal of the Royal United Service Institution, 1922, p. 39.

54. Fuller, J.F.C.: "Economic Movement", Tank Corps Journal, Vol. 3, March to September 1922. He said that Swinton had "won the war" because of his connection with the origin of the tank.

55. Liddell Hart, B.H.: "The Next Great War", Royal Engineers Journal, Vol. XXXVIII, p. 90, March 1924.

56. Comments on a memorandum from Lieut. Gen. Sir David Campbell, Liddell Hart Archives, 11/1926/1.

57. Martel, G.LeQ.: "Mechanization", Army Quarterly, Vol. XIII, p. 291, January 1927. He wanted the infantry to be put into light tanks.

58. Croft, Bt. Lieut. Col. W.D.: Second Military Prize Essay for 1919, Journal of the Royal United Service Institution, 1920, p. 440.

59. Fuller, J.F.C.: "Some Problems of Mechanical Warfare", Army Quarterly, Vol. III, p. 284, January 1922.

60. ----------: "Progress in the Mechanicalization of Modern Armies", (Lecture at RUSI), Royal Tank Corps Journal, Vol. 7, May and June 1925. Liddell Hart asked him how he proposed to test the idea that tanks should be reserved for the "fixing and decisive manoeuvre"; Fuller answered that he had had some things to say in his lecture but "the War Office cut them out".

61. Liddell Hart, B.H.: "Medieval Cavalry and Modern Tanks", Royal Tank Corps Journal, Vol. 7, p. 171,

October 1925.

62. Ogorkiewicz, R.M.: Armoured Forces, pp. 55-63. These pages describe how the British moved from an armoured division with one infantry battalion and six tank regiments in 1939 to a division with one infantry brigade and one armoured brigade in 1945. By contrast, the Germans with their very first armoured division in 1935 had had this proportion.

63. Martel, G.LeQ.: "A Suggestion Based on the Official Handbook on Mechanization", Royal Engineers Journal, Vol. XLIII, p. 576, December 1929.

64. ----------: "New Ways with Old Tasks: An Appreciation and Comment", Royal Tank Corps Journal, Vol. 11, p. 237, September 1929. Liddell Hart was also confident: "...it is unlikely that we shall fail to keep in the van of progress". Daily Telegraph, 22 August 1928, Liddell Hart Archives 10/1928/96.

65. Tilley, Maj. J.C.: "New Ways with Old Tasks: A Reply to Martel", Royal Tank Corps Journal, Vol. 11, p. 284, December 1929. Tilley wound up in Egypt with the command of the 2nd Armoured Division in 1940 but unfortunately died shortly afterwards. (Liddell Hart, B.H.: The Tanks, Vol. I, p. 391).

66. Martel, G. LeQ.: "New Ways with Old Tasks: A Reply by M Royal Tank Corps Journal, artel", Vol. 11, p. 395, March 1930.

67. House of Commons Debates, Vol. 193, Col. 116, 15 March 1926.

68. Ibid., Vol. 260, Col. 939, 1 December 1931.

69. Ibid., Vol. 263, Col. 241, 15 March 1932.

70. Ibid., Vol. 193, Col. 78, 15 March 1926.

71. Ibid., Vol. 225, Col. 201, 12 February 1929.

72. Liddell Hart, B.H.: The Tanks, Vol. I, p. 356. The missing light tanks were represented by trucks.

73. An early example of this suspicion that the tank men were "cooking" their results is given by Clarke, Lieut. F.A.S.: "Some Further Problems of Mechanical Warfare", Army Quarterly, Vol. VI, p. 377, July 1923. Clarke, an infantry man, took Fuller to task for one of his articles in which he had claimed that tanks would replace infantry and everything else. Clarke wondered about the petrol supply for the future all conquering tanks and he observed that Fuller had not deigned to mention such a lowly matter. What was the all tank force to do if its enemy retreated into the hills and the tanks could not get at

him (as was common on the North West Frontier)? He concluded by saying that he had received the impression that Fuller, in his anxiety to justify tanks, was claiming more for them than they were capable of doing. Clarke was perceptive - there are very few articles which mention either how tanks were to be supplied or how they were to be controlled. This burking of such vital details is typical of the tank enthusiasts' arguments.

74. Montgomery-Massingberd was CIGS after Milne.

75. Memorandum dated February 1926, KCL Archives, Montgomery-Massingberd Papers, 157. An open minded reading of these papers argues very strongly against the prevailing view of Montgomery-Massingberd as the arch priest of the reactionaries. In his term as CIGS considerable progress in mechanization took place. The fact that the development was not as rapid as Fuller and his followers wanted is not sufficient reason to condemn him.

Opinion was varied at the time. Hobart in 1934 described him as "far seeing, resolute and open-minded...remarkably understanding". (Letter to Liddell Hart 24 July 1934, Liddell Hart Archives, Hobart Papers 1/376). Liddell Hart described him as "the high priest of humbug". (Diary entry for 13 September 1930, Liddell Hart Archives 11/1930/1).

76. House of Commons Debates, Vol. 231, Col. 880, 5 November 1929.

77. Ibid., Vol. 262, Col. 1757, 8 March 1932.

78. Macksey, K.J.: Panzer Division, p. 10.

79. Royal Tank Corps Journal, Vol. 7, p. 20, May 1925. The incredible thing about this journey was that the Journal gave the facts in a spirit of pride in the achievement. The tanks averaged 8mph.

80. "J.T.C.": "Tanks in India", Royal Tank Corps Journal, Vol. 7, p. 93, July 1925. It should come as no surprise that the Indian authorities decided against employing the tank.

81. Dundas, Lieut. Col. J.C.: "Anti-Tank", Journal of the Royal United Service Institution, 1922, p. 106.

82. Truscott, Lieut. J.V.: "The Modifications in Field Artillery Equipment and Tactics Rendered Necessary by the Introduction of Tanks", (Duncan Prize Essay, 1922-1923), Journal of the Royal Artillery, Vol. L, p. 285, 1923-1924. "Provided that its equipment and tactics are developed on the right lines, field artillery will have nothing to fear from tanks. In fact the shoe is on the other foot." But, considering that what he was advocating was that the field artillery should equip itself with

tanks as the only antidote to tanks, he really meant that the field artillery had everything to fear from tanks.

83. "Quam Celerrime": "Prepare for Tanks!", Journal of the Royal Artillery, Vol. L, p. 500, 1923-1924. (Reprinted Royal Tank Corps Journal, Vol. 9, p. 307, January 1928).

84. Dewing, Capt. And Bt. Maj. R.H.: "Anti Tank Mines in Mobile Warfare", Royal Engineers Journal, Vol. XXXVIII, p. 61, March 1924.

85. "Anti-Tank Defence", Royal Tank Corps Journal, Vol. 6, September and October 1924.

86. Dundas, Lieut. Col. J.C.: "Some Comments on Notes for a Short Lecture on Tank Tactics", Royal Tank Corps Journal, Vol. 6, p. 189, November 1924.

87. Murley, Lieut. W.A.: "Anti-Tank Defence", Journal of the Royal Artillery, Vol. LI, p. 281, 1924-1925. (Reprinted Royal Tank Corps Journal, Vol. 6, p. 225, December 1924).

88. Perre, Capt.: "Essay on Anti-Tank defence", Journal of the Royal Artillery, Vol. LI, pp. 285 and 410, 1924-1925. (From Revue Militaire Francaise, April 1924, translated by Brig. Gen. W. Evans).

89. Kaye, Capt. G. L.: "The Evolution of Anti-Tank Defence", Journal of the Royal United Service Institution, 1925, p. 320.

90. Dunlop, Bt. Maj. W.A.S. (Australian Staff Corps): "Anti-Tank Defence", Royal Tank Corps Journal, Vol. 7, p. 290, February 1926.

91. Hutson, Capt. H.P.W.: "Tank Obstacles", Royal Engineers Journal, Vol. XL, p. 141, March 1926. (Reprinted Royal Tank Corps Journal, Vol. 7, p. 344, April 1926).

92. Tilley, Maj. J.C.: "Some Thoughts on Tanks", Journal of the Royal United Service Institution, 1927, p. 535.

93. Rowan-Robinson, Col. H.: Some Aspects of Mechanization, pp. 45-49.

94. Dawson, Lieut. P.J.: "A Reply to 'Heretic'", Royal Tank Corps Journal, Vol. 11, p. 242, September 1929.

95. Wake, Col. Sir Hereward: "The Infantry Anti-Tank Gun", Army Quarterly, Vol. XVII, p. 349, January 1924.

96. "A Ragtime Soldier": "Thoughts on Tanks", Royal Tank Corps Journal, Vol. 6, p. 199, November 1924.

97. Costin-Nian, Maj. C.B.: "Anti-Tank Guns and Things", Royal Tank Corps Journal, Vol 7, p. 120, August 1925.

98. "Pom-Pom": "The Future of the Tank", Journal of the Royal Artillery, Vol. LIII, p. 396, 1926-1927.

99. "Paradox": "An Answer to the Tank?", Journal of the Royal Artillery, Vol. LIII, p. 509, 1926-1927.

100. Brett, Maj. S.E.: "Anti-Tank Defence", Royal Tank Corps Journal, Vol. 11, p. 170, September 1929. (Reprinted from U.S. Army Infantry Journal).

101. Liddell Hart Archives, 11/1927/1a.

102. PRO/WO32/2827, 3 December 1930.

103. "Anti-Tank Armour Piercing Shell", Note from D of A to DSD, 30 November 1933, PRO/WO32/3478.

104. Royal Tank Corps Journal, Vol. 6, p. 201, November 1224.

105. Ibid., Vol 7, p. 257.

106. Ibid., Vol. 8, p. 214, October 1926. The British Army purchased a number of these but they seem to have suffered from mechanical failures according to a questionnaire sent around to the users in 1929. (PRO/WO33/3475).

107. Ibid., Vol. 9, p. 243, December 1927.

108. "Anti-Tank Weapons", Royal Tank Corps Journal, Vol. 10, p. 110, August 1928. (Reprinted from La Revue d'Infanterie). 45mm must be a misprint for 4.5mm: a shield 48 inches square and 45mm thick would weigh more than 1000 pounds!

109. Royal Tank Corps Journal, Vol. 11, p. 33.. (Reprinted from Militar-Wochenblatt). At 1000 metres (which experience has shown to be the normal range for tank encounters) the weakest (a 20mm gun firing a .14 kg. bullet at 600 metres per second) penetrated 11mm; the most powerful (a 77mm gun firing a 6.3 kg. bullet at 600 metres per second) penetrated 67mm of armour. It is not surprising, given the performance of this 77mm gun and the thinness of normal tank armour, that many people began to question whether a tank was too vulnerable to risk.

110. Heigl, Maj. F.: "New Anti-Tank Weapons", Royal Tank Corps Journal, Vol. 11, June and July 1929.

111. Royal Tank Corps Journal, Vol. 13, p. 263. It will be noted that every one of these weapons was described at one time or another in the Royal Tank Corps Journal and, therefore, the tank enthusiasts can be

considered to have known these details.

112. Germains, V.W.: The "Mechanization" of War.

113. ----------: "'Armoured Warfare': A Plea for Common Sense", Army Quarterly, Vol. XVI, p. 363, July 1928. The evident habit of tank crews to charge anti-tank guns with all guns blazing was criticized by "A Heretic": "Tank Tactics", Royal Tank Corps Journal, Vol. 11, p. 157, September 1929. The fact that the author saw fit to use that pseudonym suggests that the Tank Corps was not responding properly to the anti-tank gun challenge. It also suggests that the unfortunate predilection of British cavalry for Balaclava style charges had been transferred to the Tank Corps. This tactic would kill a lot of men in the Western Desert before Rommel's "88s" taught circumspection.

114. ----------: "The Mechanics of 'Mechanization'", Royal Engineers Journal, Vol. XLIII, p. 582, December 1929. (Reprinted Royal Tank Corps Journal, Vol. 11 p. 335, January 1930). One of Germains' peculiarities was that he never referred to mechanization or armoured warfare without putting "sneer quotes" around the words.

115. Clarke, Capt. F.A.S.: "Ground and Mechanized Forces", Journal of the Royal United Service Institution, 1929, p. 563.

116. Wake, Brig. Sir. Hereward: "Mechanization and War", Army Quarterly, Vol. XIX, p. 358, January 1930.

117. MacLeod Ross, Bt. Maj. G.: "The Utility of the Tank", Journal of the Royal United Service Institution, 1931, p. 786.

118. "Parnesius": "Is It Worth It?", Royal Tank Corps Journal, Vol. 12, p. 369, April 1931.

1. The above, of course, is a very crude summary and each country produced soldiers who called for more imaginative uses of tanks and each country produced soldiers who opposed or were sceptical towards tank development. Further, neither Britain nor France were entirely "British" or "French" in their ideas for armoured development. In Britain in the late 1930's "Infantry tanks" were designed and in France the existence of the more independent DLM broke away from the prevailing infantry notions.
Ogorkiewicz, R.M.: Armoured Forces gives a chapter to each country's organization and one to each country's designs.

2. Between 1919 and 1934, 24 completely different models were constructed in Britain and, counting experimental variants of these 24, there were no less than 39 designs.

3. Martel, G.LeQ.: "A Tank Army", Fuller Papers, KCL Archives, P/TS/9.

4. Fuller, J.F.C.: "Mechanical Warfare on Land and Sea", Tank Corps Journal, Vol. 1, p. 196, November 1919. (Reprinted from Weekly Tank Notes published by the Tank Corps during the war).

5. MacWatt, Capt S.L., Royal Tank Corps Journal, Vol. 9, p. 371, March 1928.

6. Liddell Hart, B.H.: The Tanks , Vol. I, p 281. The tanks which had crossed the T would have been exposing their largest silhouette and weakest armour to the guns of the other tanks. The only way that crossing the T would have made any sense was if the other tanks had been proceeding in line astern and very close together. In any event, tanks can get out of a line astern formation much faster than battleships can.

7. Liddell Hart, B.H.: Ibid., pp. 363-364.

8. Liddell Hart, B.H.: Ibid., p. 27.

9. Martel, G.LeQ.: "A Tank Army", Fuller Papers, KCL Archives, P/TS/9.

10. King-Hall, Lieut W.S.: "Speculations I", Journal of the Royal United Service Institution, 1920, p. 155.

11. Precis 1043, PRO/WO163/25 p. 125. Considered at Army Council meeting 273, 28 October 1920.

12. Elles, Col. Cmdt. Sir Hugh: "Some Notes on Tank Development During the War", Army Quarterly, Vol. II, p. 267, July 1921, (Reprinted Tank Corps Journal, Vol. 3, February and March 1922.

13. Fuller, J.F.C.: "The Tank - Ten Possibilities", Tank Corps Journal, Vol. 4, October, November and December

1922.

14. "A Raqtime Soldier": "Thoughts on Tanks", Royal Tank Corps Journal, Vol. 6, p. 131, September 1924.

15. Martel, G.LeQ.: "Some Comments on 'Thoughts on Tanks', Royal Tank Corps Journal, Vol. 6, p. 161, October 1924.

16. It could be argued that when Martel suggested that the light tank could fulfil virtually all functions of tanks that he was suggesting a "main battle tank". However, an under armoured AFV equipped with a machine gun cannot be considered to be a "main battle tank".

17. "A Raqtime Soldier": "Thoughts on Tanks", Royal Tank Corps Journal, Vol. 6, p. 199, November 1924.

18. "T.H.D.": "Some Comments on Martel's 'Tank Gunnery'", Royal Tank Corps Journal, Vol. 10, p. 369, February 1929.

19. Hume, Lieut. Col. E.G.: "Some Thoughts on Mobile Forces of the Future", Cavalry Journal, 1930, p. 28.

20. Liddell Hart, B.H.: The Tanks, Vol. I, pp. 14-15.

21. Wells, H.G.: "The Land Ironclads", Tank Corps Journal, Vol. 1, p. 44, 1919. (Reprinted from the Strand Magazine, December 1903).

22. "Tank Commander": "A Land Battleship in 1930", Tank Corps Journal, Vol. 1, p. 77, 1919. This thing was to be armed with 12 inch guns in barbettes. The author's choice of pseudonym suggests that he had had practical experience in tanks which is really rather surprising.

23. Tank Corps Journal, Vol. 2, p. 120, September 1920.

24. Interestingly the idea reappeared in German fantasies in late 1943. The PanzerKampfwagon Maus weighed 180 tons and at least one prototype was built. The PanzerKampfwagon E.100 was more modest at 137 tons; only a hull was completed. The British produced the Tortoise of 78 tons and the United States the T28 of 190,000 pounds towards the end of the war. The sole survivor is a Tortoise in the RAC Museum. As it was, the German King Tiger weighed more than 70 tons and was in limited production from 1943.

25. Butler, Capt. R.P.: "Thoughts on Tanks", Royal Tank Corps Journal, Vol. 12, p. 115, August 1930.

26. ----------: "Thoughts on Tanks", Royal Tank Corps Journal, Vol. 13, p. 5, May 1931.

27. The Halger Ultra bullet was a small calibre high

velocity bullet with, it was claimed, exceptional powers of penetration. See Chapter 3 Note 111.

28. "L.V.S.B.": "A Tank of the Future", Journal of the Royal United Service Institution, 1932, p. 293.

29. Winberg, Lieut. J.L.: "The Amphibious Tank in War", Royal Tank Corps Journal, Vol. 14, p. 205, December 1932. This was an old idea: the Medium D had been designed to "swim" (which it did quite well) and, until it was abandoned, there had been some speculation about the use of tanks in amphibious assaults. Vickers had built some experimental amphibious tanks in the early 1930's. (Photographs, Chamberlain and Ellis: A Pictorial History of Tanks of the World, 1915-1945, pp. 84 and 87.) In the First World War there had been a proposal that tanks might be landed at Zeebrugge and crawl their way up the sea wall, but the proposal was abandoned after tests showed that the wall was too high. Of course, the idea later bore fruit with Hobart's 79th Division and the Duplex Drive tanks used so successfully in the Normandy invasion.

30. After a number of designs in the early 1920's, Christie produced his first important one in 1928 - the M 1928. The US Army expressed interest in this and was prepared to buy it but Christie would not accept their price. Finally, after a great deal of difficulties, the US Army and Christie agreed on a contract for a tank but after some delay caused by his producing two tanks for the USSR and one for Poland (which was never delivered because Christie again demanded more money than had been agreed) this tank was produced but did not meet the required specifications and the Army would not buy it. Eventually, after more difficulties on both sides, he built and sold seven tanks to the Army. These were well received and a contract was put out for more tanks along similar lines but with changes in armament. Meanwhile Christie had evidently lost interest in this earlier design in favour of his ultra high speed turretless M 1932. The US Army was not interested in this model and it was eventually sold to the USSR. Shortly afterwards, Christie's company went into receivership. When the British bought a tank from him it was the one resulting from the US Army contract of 1930 which had failed to be acceptable. After this sign of interest, Christie produced the M 1937, another turretless tank, and tried unsuccessfully to sell it to the British. He died poor in 1944 and a recent account pronounces the epitaph of this man: "a brilliant but controversial tank designer who either could not or would not relate to the new procedure of the American military establishment". He seems to have been impossible to deal with and, when he was not demanding more money than had been agreed, he failed to deliver what had been promised. (For an excellent and detailed account of the whole business see Hofmann, G.F.: "A Yankee Inventor and the Military Establishment: The Christie Tank Ccntroversy", Military Affairs, February 1975, p. 12).

The Soviet Army built a number of fast excellent BT tanks from the Christie design and this line eventually resulted in the T-34 series, one of the best of the Second World War.

31. Liddell Hart, B.H.: The Tanks, Vol. I, p. 53.

32. Rowan Robinson, Col. H.: "The Relationship of Mobility and Power", Journal of the Royal United Service Institution, 1920, p. 572.

33. Block, Commandant D.P.: "The Future of the Tank", Tank Corps Journal, Vol. 3, p. 311, April 1922. (Translated from La Revue Militaire Francaise by Lieut. Col. Dundas). Block was quite right - as Appendix I shows, each version of the Vickers Medium was heavier than the one before it.

34. Dimmock, Capt. L.: "The Problem of the Tank", Army Quarterly, Vol. VIII, p. 376, July 1924. Oddly enough, he seemed to think that the future tank would be 50 tons, 30 feet long with a maximum speed of 30mph and a normal speed of 15mph. Few people thought that such a large vehicle could be that fast. Depending on one's point of view, Dimock could be considered either unrealistic or a prophet - no such vehicle was within the possibilities of 1924 but, on the other hand, his specifications are not unlike those of the Chieftain tank.

35. Apletre, Maj. R.C.: "Thoughts on Armour", Royal Tank Corps Journal, Vol. 7, p. 22, May 1925. The immobility of the armoured knights is sometimes over exaggerated. Most suits of armour only weighed 80 pounds or so and that weight was well distributed and carried by strong men.

36. Truscott, J.V.: "Swinging Armour", Royal Tank Corps Journal, Vol. 7, p. 177, October 1925.

37. Butler, Capt. R.P.: "Tank Characteristics", Royal Tank Corps Journal, Vol. 11, p. 377, February 1930.

38. Germains, V.W.: The 'Mechanization' of War.

39. ----------: "'Armoured Warfare': A Plea for Common Sense", Army Quarterly, Vol. XVI, p. 363, July 1928.

40. Hilton, Capt. R.: "Fire Power or Armour?", Journal of the Royal United Service Institution, 1928, p. 61.

41. Rowan Robinson, Col. H.: Further Aspects of Mechanization, pp. 39-44.

42. Martel, G.LeQ.: "New Ways with Old Tasks: Appreciation and Comment", Royal Tank Corps Journal, Vol. 11, p. 237, September 1929.

43. Quoted in Liddell Hart, B.H.: The Tanks, Vol. I, p. 262.

44. Beckett, Maj. C.T. "The Close Support of Tanks", Journal of the Royal Artillery, Vol. LVII, p. 451, 1930-1931.

45. Third Report of the Mechanical Warfare Board Covering 1 January 1931 to 31 December 1931, p. 35. (PRO/WO33/1283).

46. Butler, Capt. R.P.: "Thoughts on Tanks", Royal Tank Corps Journal, Vol. 12, p. 333, March 1931. It will be noted that Butler had earlier questioned the over emphasis on mobility. (See note 37).

47. MacLeod Ross, Bt. Maj. G.: "The Utility of the Tank" Journal of the Royal United Service Institution, 1931, p. 786.

48. The Vickers Medium with a 90bhp engine, some models of which weighed more than 12 3/4 tons, was capable of speeds greater than 15mph.

49. Mudie, Col. T.C.: "I: The Utility of the Tank", Journal of the Royal United Service Institution, 1932, p.115.

50. Williams, Capt. G.G.B.: "II: The Utility of the Tank", Journal of the Royal United Service Institution, 1932, p. 117.

51. Liddell Hart, B.H.: "Contrasts of 1931 - Mobility or Stagnation?", Army Quarterly, Vol. XXIII, p. 235, January 1932.

52. For further details of "Plan 1919", see Chapter 6.

53. Butler, Capt. R.P.: "The Tank Museum, Chapter XI, Sprung Tracks", Royal Tank Corps Journal, Vol. 8, p. 315, January 1927. Unfortunately no Medium D nor any of its derivatives survives today at the Tank Museum.

54. My account is largely drawn from Liddell Hart, B.H.: The Tanks, Vol. I, pp. 216-217. This seems to be the best secondary account.
Martel, G.LeQ.: In the Wake of the Tank, pp. 79-94 describes the engineering problems and Johnson's solutions.

There are only two primary sources on the Medium D and, so far as I have been able to find, none at all on the Light Infantry Tank or Johnson's other designs. Unfortunately these two sources contradict each other. The first is a document in the Public Record Office and the second is a digest made from War Office documents subsequently destroyed which is in the RAC Tank Museum.

PRO/WO32/4955 is a document in two parts. The first is an undated account prepared by Johnson's department chiefly devoted to showing how much better the Medium D and D** are than any other designs. This particular document is undated but dates from the appearance of the D** because it describes that tank in considerable detail. The other part of the document describes a controversy in July and August 1919 over a) how much each Medium D would cost and b) how many had been ordered. The cost problem was settled by proof being produced that the original cost of 4,500 Pounds per completed tank had risen to 12,000. This new increase of cost would naturally reduce the number that could be ordered within the Treasury limit of 550,000 Pounds and that raised the question of how many Ds had been ordered. After some more confusion, a memorandum dated 6 January 1919 was produced which stated that, as of that date, the following Ds had been ordered. From Messrs. Fosters, four (one completed, two nearly completed and the fourth to be completed at Woolwich) from Messrs Vickers, six (three "well advanced" and the other three "not so well advanced"). Therefore, as of January 1919, at least one Medium D had been completed and it is reasonable to suppose that the other two from Fosters appeared shortly after.

Willoughby, G.: "Digests of War Office Papers Now Destroyed", RAC Tank Museum, 218.25. This document claims to be an objective summary of documents dealing with the Medium D, the Independent and the Sixteen Ton Tank made by a civil servant before the documents were destroyed. There is no date on it to indicate when these digests were made but Colonel Hordern's recollection is sometime around 1960. Willoughby states that the mockup only of the Medium D was complete by 9 June 1920 and that Elles, the wartime commander of the Tank Corps, warned against the design's reliability then. By 27 July 1921 the first two Ds were complete and, a year later, on 4 July, the decision was made to stop further development. Willoughby further states that the tank development was set back because the General Staff had based the organization of the Corps on the Johnson designs.

The conflict is clear - the first source says that one D was complete in early 1919, the other says that the first did not appear until mid 1921. How can these be resolved? All that I can suggest is that Willoughby had confused the Medium D with the similar but quite different design the Light Infantry Tank which did appear in 1921.

55. "Report on Medium D Flexible Tracks", Tank Corps Journal, Vol. 4, p. 325, April 1923.
"A Tank Demonstration", Tank Corps Journal, Vol. 5, p. 24, May 1923. The date of these last two reports adds to the mystery - if work had been suspended in 1922, why were demonstrations still being given in 1923? Perhaps it was an attempt to turn opinion against the decision to stop development.

56. "Johnson Track", Royal Tank Corps Journal, Vol. 11, p. 213, 1930.

57. Butler, Capt. R.P.: Art. Cit.

58. Report of the Comptroller and Auditor General for 1924, (9 April 1925), Section 37, "Loss in Connection with Abandoned Programme of Tank Production". The Report concluded with the statement that steps would be taken to ensure that such a thing did not happen again.

59. Army Council Meeting 273, 28 October 1920, PRO/WO163/25

60. Ogorkiewicz, R.M.: Armoured Forces, p. 148.

61. As with so much else concerning British tank production between the wars, there is doubt about this figure. The figure of 160 is given by the Royal Armoured Corps Tank Museum in its pamphlet Tanks, 1919-1939, p.7 and is presumably "official". However, another and equally authoritative source says that about 200 Vickers Mediums were built. (Duncan, Maj. Gen. N.W.: "Mediums Marks I-III", p. 2 in British Armoured Fighting Vehicles 1919-1940.) Presumably the confusion arises from the retrospective modifications that were made so that some tanks may have been counted once as Mark Is and then again as Mark IAs.

62. More detailed measurements of the various different models will be found in Appendix I.

63. Data for Vickers Medium from:
Duncan, Maj. Gen. N.W.: "Mediums Marks I-III", pp. 2-12 in British Armoured Fighting Vehicles 1919-1940
Handbook for the Marks I and IA Light Tanks 1927,
Handbook for the Marks I, IA and IA* Medium Tanks 1931,
Handbook for the Marks II, II* and IIA Medium Tanks 1930,
(RAC Tank Museum, 218.22(D), 318.13 and 218.11.A respectively).
Colonel Hordern very kindly allowed me inside the exhibit at the Museum.

64. Data for the three pounder and 3.7 inch mortar from:
Duncan, Maj. Gen. N.W.: Op. Cit., pp. 9-12
Royal Tank Corps Journal, Vol. 8, p. 351, February 1927
Royal Tank Corps Journal, Vol. 10, p. 91, 1927
PRO/WO163/30, Precis 1195.

65. The radio box was about one foot high, three long and five wide. This gives an idea of the magnitude of the radio stowage problem at the time.

66. The history of the development of the 3.7 inch mortar and the Close Support tank affords us with a revealing example of the War Office at work. In March 1929 Broad attended a test firing of the mortar mounted in a tank and

reported to the War Office that it seemed to be a good idea. In July 1931 the RTC Centre asked for a mortar to be made available to it for further tests and in September, each of the four tank battalions had one for testing. The mortar then appeared in October 1932 at the Tank Gunnery School for further tests. In March 1933 the RTC Centre made its report and requested that the mortars be put in tanks. Finally, in early 1934 nine were made available to the Corps and they were mounted in tanks. From the first test until the first small scale equipping of existing tanks with an existing mortar took four years and ten months! ("Quick Firing 3.7 Inch Mortars for Tanks", PRO/WO32/3474).

67. Details of Vickers Medium variants from:
Duncan, Maj. Gen. N.W.: Op. Cit., pp. 9-12
Chamberlain and Ellis: Op. Cit., pp. 79-81 have many photographs of the tanks.

68. Duncan, Maj. Gen.: Op. Cit., p. 9.

69. Quoted by Fuller, J.F.C.: "Progress in the Mechanicalization of Modern Armies", (Lecture, RUSI, 19 November 1924). Journal of the Royal United Service Institution, 1925, p. 73.

70. The Renault FT was the most numerous tank of the times and deserves to be described as an example of the worse. The FT was hampered by slow speed (4.8mph maximum) and a one man turret in which that one man was responsible for everything except driving the tank. It is fair to say that, had the RTC been equipped with these vehicles, the experiments of the later 1920's could probably not have been carried out. It may even be that the fact that the Renault FT was suitable only for an infantry accompanying role stultified French development. (Ogorkiewicz, R.M.: Armoured Forces, pp. 170-173.)

71. Fuller, J.F.C.: Art. Cit.

72. Tilley, Maj. J.C.: "Tanks in the Defence", Royal Tank Corps Journal, Vol. 8, September and October 1926. This was the only article to unashamedly praise the Vickers Medium.

73. Talk between Liddell Hart and Pile, 28 November 1928, Liddell Hart Archives, 11/1928/19.

74. "H.B.W.S.": "The Work of the Armoured Brigade", Royal Tank Corps Journal, Vol. 9, p. 331, February 1928. (Originally published in The Fighting Forces).

75. Experimental Armoured Force Report, November 1928, PRO/WO32/2828.

76. Collins, Brig. R.J.: "The Armoured Force", Royal Tank Corps Journal, Vol. 11, p. 49, June 1929.

77. Wade, Capt. D.A.L.: "The Future of Mechanization", Journal of the Royal United Service Institution, 1929, p. 695.

78. Peck, Maj. Gen. S.C., Royal Tank Corps Journal, Vol. 11, p. 207, 1929-1930.

79. Report on Training of Tank Brigade 1934, RAC Tank Museum 214.44a.

80. Quoted in Liddell Hart, B.H.: The Tanks, Vol. I, p. 350.

81. Liddell Hart, B.H.: Op. Cit., p. 218.

82. Duncan, Maj. Gen. N.W.: Op. Cit, p. 6.

83. Martel, G.LeQ., Royal Tank Corps Journal, Vol. 6, p. 16, 1924.

84. Royal Tank Corps Journal, Vol. 9, p. 178, October 1927.

85. Second Report of Mechanical Warfare Board Covering 1 December 1929 to 31 December 1930, PRO/WO33/1243.

86. Liddell Hart, B.H.: The Tanks, Vol. I, p. 249.

87. The reason for this calculation will be given in Appendix I as will be further details of the British Tanks.

88. "It is believed that a fast general purpose tank requires a minimum of 25 horsepower per ton. <A US ton. The British equivalent would be about 28> A heavily armoured tank for the leading role might do well with 20 <22.4> or perhaps somewhat less." (Jones, Rarey and Icks: The Fighting Tanks 1916-1933, p. 186.) These figures are unnecessarily high - for example the Centurion 10 has 12.45 hp/ton and is quite a good tank. The German Leopard has one of the highest ratios today and it is only 21.12. Nonetheless, the Vickers Medium had a snall engine for its weight and its suspension was inferior to those of modern tanks.

89. PRO/WO163/24, Precis 1003/C/Tank Corps, p. 163. Considered at Army Ccuncil Meeting 258, 28 November 1919.

90. "This type gives promise of being eventually sealed as the 'heavy' tank of the future." First Report of the Mechanical Warfare Board Covering 1 January 1928 to 30 November 1929, (PRO/WO33/1217).

91. Duncan, Maj. Gen. N.W.: "A1E1 - The Independent", p. 23 in British Armoured Fighting Vehicles 1919-1940.

92. Lindsay told Liddell Hart on 15 November 1926: "Above

all it <the Independent> represents the first combined effort of tank design experts, tank gunnery experts and Vickers experts, and its highest value is the lessons learned in its production." (Liddell Hart Archives, 11/1926/1). This remark suggests that Lindsay thought tnat it was to be a "one off" design but the report quoted above (note 90) suggests the prototype of a series.
Martel, G.LeQ.: In the Wake of the Tank, p. 97 suggests that it was designed in order to give experience in heavy tanks "if we should find ourselves confronted by trench warfare again."

93. PRO/WO33/1217, p. 12.

94. Fourth Report of the Mechanical Warfare Board Covering 1 January 1932 to 31 December 1932, (PRO/WO331307.

95. Details on the Independent from:
Duncan, Maj. Gen. N.W.: "A1E1 - The Independent", pp. 21-24 in British Armoured Fighting Vehicles 1919-1940
Willoughby, G.: Op. Cit.

96. Details on the Sixteen Tonner (A6 and Medium III) from:
Duncan, Maj. Gen. N.W.: "Mediums Marks I-III", pp. 13-18 in British Armoured Fighting Vehicles 1919-1940
Willoughby, G.: Op. Cit.

97. Table taken from Royal Tank Corps Journal, Vol. 11, p. 33.. (Originally published in Militar-Wochenblatt, 25 September 1928).

98. Average cost of a Vickers Medium without guns given in answer by Worthington-Evans to question by Lieut. Cmdr. Hon. J.M. Kenworthy, House of Commons Debates, Vol. 208, Col. 1426, 7 July 1927. Cost for Medium III given in Liddell Hart, B.H.: The Tanks, Vol. I, p. 368.

99. Liddell Hart, B.H.: The Tanks, Vol. I, pp. 370-374. He says that Martel was "amazed by what he saw". He watched manoeuvres of 1,200 tanks "covering considerable distance during the four days of manoeuvres, and with practically no mechanical trouble...". Apart from the Christie suspension which allowed very high speeds in comfort, the Soviet tanks were powered with aircraft engines. Martel and Wavell's report survives in an unfiled Xerox copy in the RAC Tank Museum. The Soviet tanks had "certain features which are far in advance of ours".

100. Martel, G.LeQ.: "One and Two Man Tanks", Royal Tank Corps Journal, Vol. 8, p. 422, April 1927
----------: "A Recent Development in Mechanization", Royal Engineers Journal, Vol. XLI, p. 295, June 1927
----------: "The Origin of the Tankette", Royal Tank Corps Journal, Vol. 9, p. 330, February 1928.

101. Duncan, Maj. Gen. N.W.: "Light Tanks Marks I-VI", pp. 25-32 in British Armoured Fighting Vehicles 1919-1940.

102. Duncan, Maj. Gen. N.W.: Op. Cit., p. 26.

103. "A Military Correspondent": "The One Man Tank", Royal Tank Corps Journal, Vol. 8, p. 279, December 1926. (From the Morning Post).

104. Martel, G.LeQ.: "A Recent Development in Mechanization". Royal Engineers Journal, Vol. XLI, p. 295, June 1927.

105. Liddell Hart, B.H.: The Tanks, Vol. I, p. 250.

106. "Scabbard": "A Controversial Thesis", Royal Tank Corps Journal, Vol. 9, p. 211, November 1927.

107. Rowan Robinson, Col. H.: Some Aspects of Mechanization, p. 21.

108. Memorandum from Liddell Hart to Broad, 22 September 1927, Liddell Hart Archives, 11/1927/1a.

109. Letter from Montgomery-Massingberd to General Chetwode, 3 December 1928, KCL Archives, Montgomery-Massingberd Papers 158/1.

110. Liddell Hart, B.H.: "Armoured Forces in 1928", Journal of the Royal United Service Institution, 1928, p. 720.

111. ----------: "Army Exercises 1929", Journal of the Royal United Service Institution, 1929, p. 789.

112. Martel, G.LeQ.: "Tank Gunnery", Royal Tank Corps Journal, Vol. 10, p. 329, February 1929. He thought that a good light tank with a machine gun would be adequate as the "main field tank".

113. ----------: "New Ways with Old Tasks: A Reply by Martel", Royal Tank Corps Journal, Vol. 11, p. 395, March 1930.

114. Watkins, Capt. H.R.B.: "Aldershot Command Winter Exercise 1931", Royal Tank Corps Journal, Vol. 12, p. 371, April 1931.

115. "Carden-Loyd Mark IA Light Tank in India", Royal Tank Corps Journal, Vol. 13, p. 35, May 1931.

116. Studd, Lieut. Col. M.A.: "Notes on the Question of Rearmament with AFVs in India", Royal Tank Corps Journal, Vol. 12, p. 276, January 1931
Kenchington, Maj. A.G.: "More Thoughts on Tanks in India", Royal Tank Corps Journal, Vol. 12, p. 282,

January 1931
Birks, Capt. H.L.: "Still More Thoughts on Tanks in India", Royal Tank Corps Journal, Vol. 12, p. 334, March 1931.

117. Royal Armoured Corps Tank Museum: Tanks 1919-1939, p. 18. This figure reflects existing stocks more than it does plans. However, as Chapter 5 will show, by 1933 there was a preponderance of light tanks in the organizations given in the "Purple Primer".

118. The only other light tank produced between these years was the "Harry Hopkins" of which about 100 had been built by 1944. This was not armed with a machine gun and neither were the American light tanks which the British used. They could fight other tanks if they had to. The British Army's present light tank is the Scorpion. Apart from the fact that it has a 76mm gun, it has really been designed to take the place of armoured cars in the anticipated muddy conditions of central and northern Europe. It is very fast with a road speed of 50mph and so it can compete with an armoured car for speed.

1. Precis 1003/C, "Tank Corps", considered by Army Council Meeting 258, 28 November 1919, PRO/WO163/24.

2. Field Marshal Sir Henry Wilson.

3. Maj. Gen. A.L. Lynden-Bell.

4. Precis 1043, considered at Army Council Meeting 273, 28 October 1920, PRO/WO163/25.

5. Fuller had been a member of this committee formed to consider the future of the Tank Corps.

6. Report of Lieut. Gen. Sir William Peyton's Committee, Precis 1109, considered at Army Council Meeting 306, 27 July 1922, PRO/WO163/28.

7. Broad was scornful of the quality of these officers: "The senior officers of R. Tank Corps in 1920's were very dud. Fifty per cent. of majors a year were passed over for promotion." Talk with Liddell Hart 13 February 1947, Liddell Hart Archives 9/28/66.

8. References for the Army Estimates will be found in Appendix II.

9. The name of 1st Battalion, RTC was first used by the depot battalion but when it was abolished, the name fell into disuse.

10. Liddell Hart, B.H.: Op. Cit., 254n.

11. House of Commons Debates, Vol. 139, Col. 1288, 15 March 1921.

12. "Proposed Establishment of an Experimental Mechanized Force", 8 April 1926, PRO/WO32/2821.

13. "Experimental Formation: Moves of Units in Connection With", PRO/WO32/2822.

14. "Proposals for Initiation of Experimental Mechanized Force", PRO/WO32/2820.

15. The DSD had suggested that the Force be put under the commander of the 7th Infantry Brigade and under the overall supervision of the GOC 3rd Division. This was approved by the CIGS. (PRO/WO32/2820).

16. House of Commons Debates, Vol. 203, Col. 887, 7 March 1927.

17. So far as can be learned from a perusal of the Army List Robert John Collins was an infantry soldier who had spent his whole military career with the Royal Berkshire Regiment. He was a captain in 1914 and a major and brevet lieutenant colonel in 1918. By 1923 he was a brevet

colonel in charge of the regimental depot and, in 1927, he was a brigade commander in the 3rd Division. Why was he chosen? I do not know; perhaps he was just available and senior so that when Fuller left, Burnett-Stuart looked through a list of officers of the right rank and seniority in his division and Collins was the one.

18. Sources for the command problem:
Liddell Hart, B.H.: The Tanks, Vol. I, pp. 244-246
----------: Diary Notes, entries for 1 April, 25 April, 28 April and 29 April 1927, Liddell Hart Archives, 11/1927/1a.

This may have caused Fuller to give up hope. A marginal note in his handwriting in Liddell Hart's copy of Lectures on FSR II reads: "Recommend the book to Territorials - the Regular Army is past hope". (Liddell Hart Archives 1/302/IV.) It certainly seems to have damaged his career: "From the day I left the WO <1927> until today <1948> I have never been consulted on any question concerning tanks, either our own or foreign ones. Perhaps it was just as well." (Letter to Liddell Hart, 22 April 1948, Liddell Hart Archives 9/28/66.)

Liddell Hart believed his article to have had a decisive role in the announcement if not the formation of the Force: "Phoned Fuller in the evening. The War Office have hurriedly organized a Mechanized Force, in name at least, and under one command, as a result of my article". (Entry for 1 May 1927). It is not certain whether his impression was correct - as has been shown, the documents now available show a determination to have a Force from April 1926. However, Milne originally had thought that it would not be possible to begin the experiment before 1928, so it is just possible that Liddell Hart's article may have had something to do with the announcement of the Force for 1927. But it does seem more likely that it would have been formed in 1927 in any case.

19. Daily Telegraph, 22 April 1927, Liddell Hart Archives 10/1927/44.

20. House of Commons Debates, Vol. 205, Col. 1020, 28 April 1927.

21. Lindsay claimed that the world's first mechanized force was the Canadian Motor Machine Gun Brigades of the First World War. See Lindsay, G.M.: "Would an Orqanization Similar to the French 'Light Division' be of Value to Our Army...?", Royal Tank Corps Journal, Vol. 9, December 1927 and January 1928, first written in July 1924. That statement depends on what one means by "mechanized force" but the force of 1927 was a substantial force and was both self contained and mechanized. It is doubtful whether the CMMGB was self contained.

22. The composition of the Experimental Armoured Force

was as follows:
3rd Battalion RTC, Lieut. Col. F.A. Pile, 20 armoured cars, 16 tankettes
5th Battalion RTC, Lieut. Col. C.A. Bolton, 45 Vickers Mediums, 4 wireless tanks
2nd Battalion Somerset Light Infantry, Lieut. Col. H.I.R. Allfrey, a machine gun battalion with transport
9th Field Brigade RA, Lieut. Col. C.R.B. Carrington, 2 dragon towed batteries, 1 truck towed battery, 1 battery self propelled guns
9th Light Battery RA, truck towed battery
17th Field Company RE, Maj. G.LeQ. Martel, carried in trucks

Air assistance was supplied by the following at various times:
No. 16 (Army Co-Operation), No. 3 (Fighter) and Nos. 7 and 11 (Bombing) Squadrons RAF.

23. Liddell Hart, B.H.: The Tanks, Vol. I, p. 249.

24. ----------: Diary Notes, Entry 4 May 1927, Liddell Hart Archives, 11/1927/1a.

25. ----------: The Tanks, Vol. I, p. 249.

26. Collins has come in for much criticism from Liddell Hart especially. In that connection the following is of interest:

> Drove out to Tidworth...and had a talk with Col. Collins about the lessons of last night's show. Found he improves each time with further acquaintance. Immensely keen and practical. I still hold that Boney <Fuller> could have reached at first bound by intuition and understanding a point whither Collins is working by trial and error - yet is undoubtedly moving towards it in short steps. Boney, as Martel I think said, has ten years' start in mechanization study. Boney would have gone thus: <a drawing of a straight line> C is going thus: <a drawing of a series of hops>. And the process will take longer and lose time. But C is going right way. I suggested to him my idea that mechanized forces should not move on road in close column, but independently by vehicle by 5-10 mile bounds from halting point to halting point. He showed distinct tendency towards agreement.

Diary Notes, Entry 22 August 1927, Liddell Hart Archives 11/1927/1a.

27. An original text of the speech with notes in Milne's handwriting is to be found in the Liddell Hart Archives, 11/1927/7.

28. ----------: The Tanks, Vol. I, p. 250.

29. Sources for Experimental Mechanized Force:
Liddell Hart, B.H.: The Tanks, Vol. I, pp. 247-254
Martel G.LeQ.: In the Wake of the Tank, pp. 148-169
Studd, Lieut. Col. M.A.: "Mechanized Force and Manoeuvres 1927", Royal Tank Corps Journal, Vol. 9, December 1927 and January 1928.

30. Record of a conversation between Pile and Liddell Hart, 28 November 1928, Liddell Hart Archives, 11/1928/19.

31. "The disbandment of the Armoured Force was due to Montgomery-Massingberd (GOC Southern Command) and as David Campbell (GOC in C Aldershot Command) tended to support him, Milne gave way to their desires". Conversation with Pile, Ibid.

32. In a letter to Gen. Chetwode, 3 December 1928, he said that he thought that the CIGS had abandoned the Force because he wanted to form two experimental infantry brigades "to see how we can improve their mobility and fire power". KCL Archives, Montgomery-Massingberd Papers, 158/1.

33. House of Commons Debates, Vol. 220, Col. 216, 27 November 1928. Answer to Brig. Gen. Clifton Brown.

34. Report from Montgomery-Massingberd, 24 November 1928, Experimental Armoured Force Report 1928, PRO/WO32/2828.

35. Report from Burnett-Stuart, November 1928, Op. Cit.

36. Collins, Col. Cmdt. R.J.: "The Experimental Mechanized Force", (Lecture RA Institute 6 December 1927) Journal of the Royal Artillery, Vol. LV, p. 12, 1928/1929. (Reprinted Royal Tank Corps Journal, Vol. 10, p. 43, June 1928).

37. Collins, Brig. R.J.: "The Armoured Force", (Lecture SME Chatham 1 November 1928), Royal Engineers Journal, Vol. XLIII, p. 30, March 1929. (Reprinted Royal Tank Corps Journal, Vol. 11, p. 49, June 1929). For some reason Collins' report is missing from PRO/WO32/2828 (see Note 34). However, his report (and those of the other two) is in RAC Tank Museum 04.225.

38. "H.B.W.S.": "The Work of the Armoured Brigade", Royal Tank Corps Journal, Vol. 9, p. 331, February 1928. (Originally printed in The Fighting Forces).

39. Broad did not think that a case could be made for the inclusion of infantry in such a force: they could be added in buses whenever they were needed. "Remarks by Col. Broad", PRO/WO32/2828.

40. Liddell Hart, B.H.: "The Army and the Future -

Lessons of 1928", Royal Tank Corps Journal, Vol. 10, p. 242, November 1928. (Originally published in the Daily Telegraph).

41. ----------: "Armoured Forces in 1928", Journal of the Royal United Service Institution, 1928, p. 720.

42. "OTAC": "Impressions of the Armoured Force Training", Army Quarterly, Vol. XVII, p. 276, January 1929.

43. "Experimental Formations for 1929", Memorandum from CIGS to Secretary of State for War, November 1928, PRO/WO32/2825.
Report on the Staff Conference held at the Staff College, Camberly, 14-17 January 1929, RAC Tank Museum 214.05.

44. It was translated into German "and for many years served as the theoretical manual for our developing ideas". Guderian, H.: Panzer Leader, p. 22. He refers to it as the handbook of 1928.

45. Mechanized and Armoured Formations 1929, p. 7. In many cases the exact wording reappeared in Modern Formations 1931.

46. Ibid., p. 16.

47. Ibid., p. 26.

48. Ibid., p. 20 (Modern Formations, p. 29.)

49. Ibid., p. 26.

50. Ibid., pp. 18, 53, 54.

51. Ibid., pp. 17, 57, 58.

52. Modern Formations, p. 7.

53. Ibid., p. 8.

54. Ibid., p. 9.

55. Ibid., p. 10.

56. Ibid., p. 12. If armies became smaller, the small British Army would no longer be so comparatively small.

57. Ibid., p. 21.

58. Ibid., p. 21.

59. Ibid., pp. 25, 73, 74.

60. Ibid., pp. 25, 75, 76.

61. Second Report of the Mechanical Warfare Board Covering 1 December 1929 to 31 December 1930, p. 23, PRO/WO33/1243.

62. Colonel (later Major General) A.C. Fuller. (Liddell Hart, B.H.: The Tanks, Vol. I, 290n).

63. Broad, Sir Charles: Letter to the Librarian, London School of Economics, 29 August 1974, KCL Archives, Broad Papers III.

64. ----------: Letter to the Librarian, King's College, London, 12 August 1968, KCL Archives, Broad Papers, I/2.
Report on Training of First Brigade RTC 1931, RAC Tank Museum 214.44.

65. "Sansfil": "Wireless on Tanks", Tank Corps Journal, Vol. 4, p. 72, July 1922.

66. ----------: "Intercommunication Between Tanks in Action", Tank Corps Journal, Vol. 3, p. 281, March 1922. "Sansfil" offered to answer any queries about radio communication which were asked of him, but these two articles were the only ones which he wrote. We must conclude that either he gave up or no one took up his offer.

67. Sargeaunt, Capt. W.T.: "Control", Royal Tank Corps Journal, Vol. 6, p. 137, September 1924.

68. "The Horseman": "Intercommunication Between Tanks on the Move", Royal Tank Corps Journal, Vol. 6, p. 327, April 1925.

69. Pope, Maj. V.V.: "Tanks and Armoured Cars: Their Use and Antidote", (Lecture at SME Chatham 27 October 1927), Royal Engineers Journal, Vol. XLII, p. 62, March 1928.

70. "F.S.M.": "Signals and Mechanization", Army Quarterly, Vol. XVI, p. 386, July 1928.

71. Mechanized and Armoured Formations, Appendix I, p. 50.

72. Liddell Hart, B.H.: "Contrasts of 1931 - Mobility or Stagnation", Army Quarterly, Vol. XXIII, p. 235, January 1932.

73. Broad, Sir Charles: Letter to R.A. Rickard, University of Waterlco, Canada, 23 June 1970, KCL Archives, Broad Papers II/3.

74. Liddell Hart, B.H.: "Mind and Machine: Part II, Tank Brigade Training 1932", Army Quarterly, Vol. XXVI, p. 51, April 1933.

75. Fuller, J.F.C.: Gold Medal (Military) Prize Essay for 1919, Journal of the Royal United Service Institution, 1920, p. 239.

76. ----------: "The Influence of Fast Moving Tanks on the Encounter of Battle", Royal Tank Corps Journal, Vol. 5, March and April 1924.

77. Sargeaunt, Capt. W.T.: "Notes for a Short Lecture on Tank Tactics", Royal Tank Corps Journal, Vol. 6, p. 227, December 1924.

78. Lindsay, G.M.: "Would an Organization Similar to the French 'Light Division' be of Value to our Army...?", Royal Tank Corps Journal, Vol. 9, December 1927 and January 1928, first written in July 1924. In 1924 the French Army had begun small scale experiments with mechanized forces.

79. Eden, Maj. H.C.H.: "A Mobile Light Division", Journal of the Royal United Service Institution, 1928, p. 54. 1928, p. 54.
"Little Willie": "An Armoured Brigade", Royal Tank Corps Journal, Vol. 9, p. 365, March 1928.
The latter did not want infantry integral to such a formation because he thought that they would need to be protected. That was a common assumption at the time - that the infantry had to be protected. No one thought that the infantry might protect the tanks even though that had been the basis of tank tactics in the First World War.

80. Burnett-Stuart, Maj, Gen. Sir John: "The Progress of Mechanization", (Lecture at University of London 8 March 1928), Army Quarterly, Vol. XVI, p. 30, April 1928.

81. Martel, G.LeQ.: "A Suggestion Based on the Official Handbook on Mechanization", Royal Engineers Journal, Vol. XLIII, p. 576, December 1929.

1. Army Council Meetings 209 (26 April 1917) and 213 (5 June 1917) PRO/WO163/22.

2. House of Commons Debates, Vol 125, Col 1345, 23 February 1920. Churchill was Secretary of State for War and Air at the time.

3. Precis 1037, PRO/WO163/25.

4. CID Meeting 134, 14 December 1920, PRO/CAB2/3.

5. Memorandum from Hankey reporting a discussion with Chamberlain (Secretary of State for Foreign Affairs), dated 28 November 1924. Attached to minutes of CID Meeting 187, 28 July 1924. PRO/CAB2/4.

6. CID Meeting 147, 31 Cctober 1921, PRO/CAB2/3.

7. CID Meeting 151, 26 November 1921, PRO/CAB2/3.

8. CID Meeting 157, 24 March 1922, PRO/CAB2/3. This forecast had been supplied by the Air Staff.

9. Interim Report of the (CID) Subcommittee on National and Imperial Defence, November 1923, PRO/CAB21/262.

10. CID Meeting 218, 25 November 1926, PRO/CAB2/4. The memorandum had been written by the Permanent Undersecretary of the Foreign Office but Chamberlain was in full agreement.

11. "The Present Distribution and Strength of the British Army in Relation to its Duties", 1 November 1927, PRO/WO32/2823.

12. CID Meeting 193, 5 January 1925, PRO/CAB2/4.

13. CID Meeting 254, 22 March 1932, PRO/CAB2/5.

14. Memorandum from Montgomery-Massingberd (CIGS) to Hankey, 11 September 1933, PRO/CAB21/369.

15. Memorandum by CIGS as Basis of 'Military Policy' in COS Report 1930, PRO/CAB21/368.

16. This was a General Staff estimate. CID Meeting 150, 23 November 1921, PRO/CAB2/3.

17. CID Meeting 239, 13 December 1928, PRO/CAB2/5.

18. CID Meeting 248, 29 May 1930, PRO/CAB2/5.

19. "Some Problems of the World Situation:A Military Appreciation", Lecture to Senior Officers' School by DMO&I (Maj. Gen. J.R. Charles) 3 December 1930, Copy sent to Prime Minister January 1930. PRO/WO32/4079.

20. "Training Directive for British Army at Home", 29 December 1931, PRO/WO32/3228. It is quite impossible to imagine what country had an army that was as small as that given and yet which could be expected to have such a full complement of tanks, artillery, signals and engineers as that described. The armies of the major powers were larger and the armies of minor powers would not likely have such modern equipment. It is tempting to surmise that such a peculiar force is described because it was all that the British could handle.

21. "Definition of Small, Minor and Great War", PRO/WO32/5295.

22. Army Training Memorandum 4A, 1932 PRO/WO32/3115.

23. Macleod, R. and Kelly, D. (Eds.): The Ironside Diaries 1937-1940, pp. 393-394.

24. "Composition of Expeditionary Force for Small Wars", 21 February 1923, PRO/WO33/1023.

25. "Composition of the Expeditionary Force", 28 November 1924, PRO/WO33/1058.

26. "Composition of Regular Expeditionary Force", 1 January 1930, PRO/WO33/1187.

27. Interim Report of Expeditionary Force Committee, December 1932, PRO/WO33/1303.

28. Public Record Office, Index to Cabinet Conclusions, 1919-1933.

29. CID Meetings 133 (29 June 1920) to 260 (28 June 1933), PRO/CAB2/3-5.

30. COS Subcommittee Meetings 1 (July 1923) to 115 (November 1933), PRO/CAB53/1-4. The one reference is in November 1929 and concerned the mechanization of native units in the colonies. Not only is there no reference to tanks, but, in Vol 4, there is no reference even to the Army!

31. Mechanized and Armoured Formations 1929, p. 11, Modern Formations 1931, p. 18-19.

32. Ibid., p. 12 ,Ibid., p. 19.

33. Modern Formations, 1931, p. 25.

34. Ibid., p. 19.

35. Mechanized and Armoured Formations 1929, p. 27, Modern Formations 1931 p. 38.

36. Fuller, J.F.C.: "The Application of Recent

Developments in Mechanical and Other Scientific Knowledge to Preparation and Training for Future War on Land", Journal of the Royal United Service Institution, 1920, p. 239.

37. ----------: "Tanks in Future Warfare", Tank Corps Journal, Vol. 3, October, November and December 1921.

38. ----------: "Economic Movement", Tank Corps Journal, Vol. 3, March to September 1922.

39. ----------: "The Tank - Ten Possibilities", Tank Corps Journal, Vol. 4, October, November and December 1922.

40. ----------: "The Influence of Fast Moving Tanks on the Encounter of Battle", Royal Engineers Journal, Vol. XXXVII, p. 603, December 1923 (Reprinted in Royal Tank Corps Journal, Vol. 5, March and April 1924).

41. Moore, Lieut. W.: "Mechanization and Military Policy", Journal of the Royal United Service Institution, 1928, p. 475.

42. Germains, V.W.: "The Mechanics of 'Mechanization'", Royal Engineers Journal, Vol. XLIII, p. 582, December 1929 (Reprinted Royal Tank Corps Journal, Vol. 11, p. 335, January 1930).

43. ----------: "The Limitations of the Tank", Journal of the Royal United Service Institution, 1930, p. 124.

44. Baird Smith, Lieut. Col. A.G.: "Theory and Practice of Mechanization", Journal of the Royal United Service Institute, 1930, p. 302.

45. Sources for "Plan 1919":
Fuller, J.F.C.: Memoirs of an Unconventional Soldier, pp 318-322,
----------: "Tank Operations Decisive and Preparatory, 1918-1919", KCL Archives, Fuller Papers P/TS/40,
----------: "The Tactics of the Attack as Affected by the Speed and Circuit of the Medium D Tank", KCL Archives, Fuller Papers P/TS/50.

Colonel P.H. Hordern, Curator of the RAC Tank Museum, does not believe Plan 1919 to have been realistic. The number of Medium Ds required could not have been ready in 1919; if ready, they would not have worked. He does not believe that the Mark VIII (the heavy tank Fuller had in mind) would have been able to do its job either. Talk with the author, 23 July 1975.

46. Sargeaunt, Capt. W.T.: "Notes for Lecture II - Tank vs Tank", Royal Tank Corps Journal, Vol.6, July 1924.

47. ----------: "Tactics - Some Thoughts",

Royal Tank Corps Journal, Vol. 7, August and October 1925.

48. Pile, F.A.: "The Problem of the Tank" (Lecture to RA Institute, 18 November 1924), Journal of the Royal Artillery, Vol. LII, p. 217, 1925-1926.

49. Memorandum from Liddell Hart to Broad, 22 September 1927, Liddell Hart Archives, 11/1927/1a.

50. Martel, G.LeQ.: "The Employment of Tankettes", Royal Tank Corps Journal, Vol. 9, p. 37, June 1927.

51. Mudie, Col. Cmdt. T.C.: "The Possible Future Development of Armoured Mechanical Vehicles and Their Effect on Tactics", Royal Tank Corps Journal, Vol. 9, p. 140, September 1927.

52. "Little Willie": "An Armoured Brigade", Royal Tank Corps Journal, Vol. 9, p. 365, March 1928.

53. There were a number of articles written at the time which had titles like "Tanks and Tactics" which, in fact, did not have very much to do with tactics. More often, these articles would be rather vague and content themselves with general statements on the expected devastating effect of tanks - usually on the infantry. Enemy tanks are never anywhere to be seen.

54. Collins, Brig. R.J.: "The Armoured Force", (Lecture SME Chatham, 1 November 1928) Royal Engineers Journal, Vol. XLIII, p. 30, March 1929 (Reprinted Royal Tank Corps Journal, Vol. 11, p. 49, June 1929).

55. ----------: "Experimental Mechanized Force", (Lecture RA Institute, 6 December 1927) Journal of the Royal Artillery, Vol. LV, p. 12, 1928-1929 (Reprinted Royal Tank Corps Journal, Vol. 10, p. 43, June 1928). It is reasonable to say that these two lectures were semi-official. They do not conflict with any of the official conclusions and it is likely that Collins made these lectures and had them published in order to inform the Army at large of the results of the experiments.

56. "Forward": "Tanks and Infantry Attack in Mobile Warfare", Journal of the Royal United Service Institution, 1932, p. 282 (Reprinted Royal Tank Corps Journal, Vol. 14, p. 64, July 1932).

57. One example is Mudie's article; see note 51 above.

58. Principal examples were the US M3 and M5 light tanks, M3 and M4 medium tanks, M10 and M36 tank destroyers.

1. House of Commons Debates, Vol. 139, Col. 1288.

2. Ibid., Cols. 1298-1301. Seely had been Secretary of State for War in the Liberal Government before the war. His justification for this statement about every advance in science making the horse more and more indispensable is to be found in his belief and experience that mechanical vehicles in the conditions of warfare soon break down (see Seely, J.E.B.: Fear and be Slain, p. 119). This contention was no doubt caused by the high breakdown rate of the war time tanks.

3. Brig. Gen. J.T. Wigan, Ibid., Col. 1308.

4. Col. J.C. Wedgwood, Ibid., Col. 1349. He believed that armoured cars could replace cavalry and called for further reductions in cavalry strength.

5. Maj. Sir Keith Fraser, Ibid., Col. 1354.

6. Maj. Sir Keith Fraser was the proposer of the motion. (House of Commcns Debates, Vol. 140, Col. 1979.) Rather ludicrously he argued that, if the cavalry men were given light tanks, they would need only a year to learn all about them and then what would they do with their time?

7. Sir Charles Townshend (in the absence of Seely), Ibid., Col. 1990.

8. Lieut. Col. McLean, Ibid., Col. 1992. Tanks were only a "moderate success".

9. Lieut. Col. M. Archer-Shee, Ibid., Col. 1995. This predominance of the cavalry in the highest ranks may, of course, cnly suggest class prejudice.

10. Lieut. Col. G.D. White, Ibid., Col. 2004.

11. Maj. D.W. Morgan, Ibid., Col. 2005. Another speaker was Col. L. Ward (Ibid., Col. 1998): "The fact remains that the cavalry contributed less to the ultimate victory...on the Western Front than any other unit of the Allied forces, except perhaps the Army Veterinary Corps."

12. Ibid., Cols. 2014 and 2019.

13. Cavalry had been more effective on the Eastern Front and it is interesting that there were few references made in the British journals to these actions in which cavalry was sometimes able to move considerable distances.

14. France and Belgium 1914, pp. 71-294.

15. Gough, Gen. Sir Hubert: The Fifth Army, p. 323. Gough was, of course, very partisan in any account of the retreats of 1918 but, it seems that his comment is none the less valuable.

16. France and Belgium 1917, Vol. III, pp. 69-72
Canadian Official History, p. 163.
See Note 20 below.

17. France and Belgium 1918, Vol. IV, p. 156
Canadian Official History, pp. 406-437 ("a great opportunity was lost")
Australian Official History, pp. 615-616.

18. For an example see Note 26 below.

19. Egypt and Palestine, Vol. II. P. 447 to end.
Falls, C.: Armageddon 1918.
Gullett, H.S.: Australian Official History, Sinai and Palestine, p. 677 to end.

20. Pitman, Maj. Gen. T.T.: "The Part Played by the British Cavalry in the Surprise Attack on Cambrai, 1917", Cavalry Journal, 1923, p. 235. He criticized the apparent inability of the forward cavalry commanders to act on their own initiative (which, in itself, does not say very much for the supposed powers of swift decision which, it was claimed, cavalry training gave). He then devoted a good deal of space to the exploits of B Squadron, Fort Garry Horse (from the Canadian Cavalry Brigade) and speculated on what might have happened if the rest of the regiment had been allowed to cross the river. This sort of speculation was no different than that on the exploits of "Musical Box" at Amiens which was current in the Tank Corps. In each case only one small part of a larger unit was being taken as an example of what could have been done. But the large units had had exactly the same chance as the small ones. Such speculation was entertaining but can the adventures of one tank or one squadron really be taken as typical of what will happen in the future?

21. Canadian Official History, p. 404.

22. Gough, Gen. Sir Hubert: The Fifth Army, p. 284.

23. Canadian Official History, pp. 370-371.
Liddell Hart, B.H.: History of the First World War, p. 395. General Seely led the Brigade on this attack.

24. One example of the more usual fate of the cavalry should suffice. On 10 April 1917 a cavalry brigade attacked German infantry with machine guns at Feuchy Chapel. "The result was mere massacre. Hundreds of men and horses dropped in a few minutes; and the remainder, turning about, fled for shelter behind the crest." (Browne, Capt. D.G.: The Tank in Action, pp. 66-67).

25. Reports of the Committee on the Lessons of the Great War, PRO/WO32/3116.

26. Fuller, J.F.C.: "The Influence of Tanks on Cavalry

Tactics", Cavalry Journal, 1920, pp. 109, 307 and 510 (a three part article). Fuller here was claiming that the battle of Megiddo could have been carried out by tanks which suffered up to 50% breakdown casualties per day, had a top speed of 7mph and a very limited range. This does not seem very likely.

27. ----------: Gold Medal (Military) Prize Essay for 1919, Journal of the Royal United Service Institute, 1920, p. 239.

28. ----------: "Some Problems of Mechanical Warfare", Army Quarterly, Vol. III, p. 284, January 1922.

29. ----------: "Progress in the Mechanicalization of Modern Armies", Royal Tank Corps Journal, Vol. 7, May and June 1925.

30. Letter from Fuller to Liddell Hart. Undated but probably in April 1948. Liddell Hart Archives 9/28/66.

31. Fuller, J.F.C.: Lectures in FSR III, p. 16.

32. Liddell Hart, B.H.: "The Next Great War", Royal Engineers Journal, Vol. XXXVIII, p. 90, March 1924.

33. Burnett-Stuart, Maj. Gen. Sir John: "The Progress of Mechanization", (lecture at the University of London, 8 March 1928), Army Quarterly, Vol. XVI, p. 30, April 1928.

34. Costin-Nian, Maj. C.B.: "Tanks, Cavalry and the Arme Blanche", Royal Tank Corps Journal, Vol. 6, p. 53, June 1924. This article is cast in the form of a discussion between tank man, cavalry man and staff officer. The tank man criticizes the cavalry and the cavalry man contents himself with saying that there does not exist any tank capable of taking the field. The staff officer argues for constant experiment.

35. Collins, Brig. R.J.: "The Armoured Force", Royal Tank Corps Journal, Vol. 11, p. 49, June 1929.

36. House of Commons Debates, Vol. 193, Col. 116, 15 March 1926.

37. Charrington, Maj. H.V.S.: "Where Cavalry Stands Today", Cavalry Journal, 1927, p. 13.

38. Hume, Maj. E.G.: "Some Thoughts on Modern Reconnaissance", Cavalry Journal, 1928, p. 211.

39. Stewart Blacker, Maj. L.V.: "Mechanized Warfare in Asia", Journal of the Royal United Service Institution, 1929, p. 17.

40. "The Future of Cavalry", (Lecture at the University of Bristol, 7 February 1929), Cavalry Journal, 1929, p. 365.

41. Barrow, Gen. Sir George: "The Future of Cavalry", Cavalry Journal, 1929, p. 176.

42. Hume, Lieut. Col. E.G.: "Some Thoughts on Mobile Forces of the Future", Cavalry Journal, 1930, p. 28. Interesting in this article is the strong suggestion that cavalry in the future will merely be the auxilliary to the AFVs.

43. Fuller, J.F.C.: "Tanks in Rear Guard Operations", Journal of the Royal Artillery, Vol. LII, p. 261, 1925-1926.

44. House of Commons Debates, Vol. 193, Col. 97, 15 March 1926.

45. Ibid., Col. 116.

46. Mulliner, Maj. A.R.: "Cavalry Still an Essential Arm", Cavalry Journal, 1927, p. 640.

47. Col. C.K. Howard Bury, House of Commons Debates, Vol. 214, Col. 1293, 8 March 1928.

48. Hume, Maj. E.G.: "Some Thoughts on Modern Reconnaissance", Cavalry Journal, 1928, p. 211.

49. Report on Experimental Armoured Force, 24 November 1928, PRO/WO32/2828.

50. "The Future of Cavalry", Cavalry Journal, 1929, p. 365.

51. Barrow, Gen. Sir George: "The Future of Cavalry", Cavalry Journal, 1929, p. 176. Barrow had commanded the 4th Cavalry Division at Megiddo.

52. "OTAC": "Impressions of the Armoured Force Training", Army Quarterly, Vol. XVII, p. 276, January 1929.

53. Watkins, Capt. H.R.B.: "Aldershot Command Winter Exercise 1931", Royal Tank Corps Journal, Vol. 12, p. 371, April 1931. Sir David Campbell was the GOC.

54. Liddell Hart, B.H.: "Mind and Machine: Tactical Training in 1932", Army Quarterly, Vol. XXV, p. 237, January 1933.

55. Discussion after lecture at RUSI, 20 October 1926. (Hambro, Maj. Gen. Sir Percy: "The Horse and Machine in War", Journal of the Royal United Service Institution, 1927, p. 85.) Hambro had mainly talked about transport and had advocated replacing all horses (except a few pack

horses for mountains) with machines.

56. Wall, C.C.: "La Reine des Armes Blanches", Cavalry Journal, 1928, p. 261. Perhaps not an entirely idiotic suggestion: a number of cavalry units had asked to be issued with the lance in the closing stages of the Palestine campaign. (Howard-Vyse, Lieut. Col. R.G.H.: "A Defence of the Arme Blanche", Cavalry Journal, 1920, p. 323).

57. "An Indian Cavalry Officer of the Old Fifth Division": "Cavalry and Tanks", Cavalry Journal, 1920, p. 558.

58. F.M. Earl Haig: "Cavalry, An Essential Arm", (Address given 10 October 1921 at Canterbury), Cavalry Journal, 1922, p. 6. As I have shown, there were good reasons for saying this sort of thing about the future usefulness of cavalry. The trouble with this article, and others like it, however, is that no reasons are ever given. The articles or speeches are a series of flat statements which, without supporting material, sound rather silly. Such pronouncements gave the cavalry argument a bad name.

59. Cavalry Questionnaire and complete copies of all answers received, Minutes of the meetings of the Committee and other Cavalry Committee Papers in KCL Archives, Montgomery-Massingberd Papers, 157.

60. Report of Cavalry Staff Exercise, Aldershot, 19-22 April 1926, KCL Archives, Montgomery-Massingberd Papers, 157.

61. Interim Report of Cavalry Committee, PRO/WO32/2841. Considered at Army Council Meeting 356, 9 February 1927 (PRO/WO163/33).

62. Final Report of Cavalry Committee, PRO/WO32/2842.

63. Letter from Broad to R.A. Rickard, Waterloo University, Canada, 23 June 1970, KCL Archives, Broad Papers, II/3.

64. The Memorandum was dated 30 June 1927 and signed by Milne (CIGS), W.P. Braithwaite (AG), W.H. Anderson (QMG) and Noel Birch (MGO). (See next note).

65. Letter from Churchill, letters from Milne to Worthington-Evans, letters from Robertson and Allenby, Memorandum on cavalry from Military Members and Worthington-Evans' covering letter to the Prime Minister are all in PRO/WO32/2846. Haig's letter was actually sent to Lord Salisbury's Committee on 30 December 1927 (PRO/CAB21/292) and therefore is not properly part of the Churchill letter episode. However, Milne did apparently write to Haig asking his views and therefore we may

conclude either that Haig's answer was late or that the letter he did send Milne has been lost. The file itself is a disorderly one and I may be mistaken in my construction of cause and effect. However, if I am, it does not matter very much because all the material is relevant to one or other of the cavalry enquiries going on at the time.

66. "Future Organization of Cavalry", PRO/WO32/2845. The CID had approved the report at Meeting 235, 22 May 1928 (PRO/CAB2/5).
The other figures for the ratio of cavalry squadrons to infantry battalions were:

France 1929	.59	.53 in 1914
USSR 1927	.48	.57 in 1914
USA 1927	.68	2.00 in 1914
Britain 1928		
Expeditionary Force	.34	.68 in 1914
Regular Army, Home and Abroad (Excluding India)	.33	.66 in 1914
Regular Army, Territorial Army Home and Abroad (Excluding India)	.27	.74 in 1914
Regular Army in India	.33	.52 in 1914

These figures show first that Britain was by no means the only country to keep cavalry and, second, that the British Army had less cavalry proportionately than the other three countries and, third, that the British had half as much cavalry proportionately in 1928 as in 1914.

67. Question by Col. Rt. Hon. J.C. Wedgewood, 23 February 1926, House of Commons Debates, Vol. 192, Col. 279.

68. Ibid., Vol. 203, Cols. 875-1273, 7 March 1927.

69. Lord Apsley was attacking on the grounds that tanks were not reliable enough. He then made the remarkable suggestion that tank crews should be armed with cutlasses! Ibid., Vol. 214, Cols. 1318-1323, 8 March 1928. Apsley was probably the most reactionary of all the cavalry defenders in the House and could always be counted on to rise to his feet if the cavalry was impugned or the tanks upheld. However, even he changed eventually: in 1935 he actually suggested turning the 3rd Hussars into an armoured car regiment. (Ibid., Vol. 299, Col. 929).

70. Ibid., Vol. 250, Cols. 293-294, 24 March 1931. He was replying to a speech by J.J. Tinker. Tinker, on the

left wing of the Labour Party, was to the anti cavalry forces what Apsley was to the pro cavalry side. Tinker used to derive pleasure from suggesting things calculated to offend the cavalry men; for example, he once proposed that the LCC pay for the upkeep of the Household Cavalry because these units were only useful as a tourist attraction. (Ibid., Vol. 262, Col. 1685, 8 March 1932). The byplay between these two factions enlivens the dull pages of the Army debates.

71. House of Commons Debates, Vol. 276, Cols. 208-210. At this time Duff Cooper spoke for the War Office in the Commons because the Minister, Lord Hailsham, was in the Lords. Duff Cooper eventually became Secretary of State for War in 1935 and remained so until he went to the Admiralty in 1937. Hailsham kept pretty quiet in the House of Lords on Army matters.

72. These three men were the War Office representatives in the House of Commons for virtually the entire period. Worthington-Evans was Secretary of State from January 1921 to October 1922 and again from November 1924 to June 1929. Shaw succeeded him until August 1931. Duff Cooper was Financial Secretary from Shaw's departure until the end of 1935 whereupon he became Secretary of State. Throughout this period a typical speech from a Secretary of State for War would say that everything was proceeding well so far as mechanization was concerned but that it was too early to make permanent decisions.

73. "Organization of Armoured Car Cavalry Regiment", Committee Meeting 1 December 1927, PRO/WO32/2844.

74. Memorandum from CIGS to AG, 11 July 1927, PRO/WO32/2844.

75. "Nomad": "The Armoured Car-biniers", Cavalry Journal, 1928, p. 469. I think it is safe to assume that this poem was written by an officer. A private or sergeant would not have written in the dialect - to him those pronunciations were perfectly correct English. Therefore, the poem is a bit of a fraud: the reader is supposed to think that it reflected the feelings of the lower ranks. However, recruiting figures make it clear that the RTC had no shortage of enlistments, was generally getting a better educated recruit than the norm and had a lower loss rate in the first six months than any other part of the Army. (These figures were given annually in the Army Estimates.) From this it is reasonable to conclude (although there are no figures) that the armoured car cavalry regiments probably got more recruits once they got rid of their horses. After all, mechanics was a much more useful trade than horsemastership then or now.

76. Pitman, Maj. Gen. T.T.: "Back to the Chariot", Cavalry Journal, 1928, p. 306.

77. "The Mounted Trooper in 1918 and 1930", Cavalry Journal, 1930, p. 579. The reduction had been effected by placing food, the greatcoat, the nose bag, some ammunition and the rider's toilet articles in the first line motor transport.

78. Army Estimates 1926/27 and 1933/34. The figure for fodder represents the whole Army and reflects not only the reduction in horses in the cavalry but also in the Army generally. The figure for horses in the cavalry is, of course, a more accurate measure of the mechanization than the figures for men (which did not much decrease) because some of the cavalry men were driving armoured cars. The overall reduction in horses in the cavalry was 36% in seven years which was fairly considerable. It also suggests that, in fact, the cavalry was reduced to make way for the tanks.

79. Taylor, A.J.P.: Review of Too Serious a Business, Observer, 16 March 1975.

80. Liddell Hart, B.H.: The Tanks, Vol I, p. 257.

81. Pitt, Barrie: Introduction to Macksey, P.J.: Panzer Division.

82. Crow, D: "British Armoured Units and Armoured Formations (1919-40)", in British Armoured Fighting Vehicles 1919-1940, p. 150

83. Letter from Broad to R.A. Rickard, Waterloo University, Canada, 23 June 1970, KCL Archives, Broad Papers, II/3.

84. Wavell, Brig. A.P.: "The Army and the Prophets", Journal of the Royal United Service Institution, 1930, p. 665.

85. Allen, Col. Robert S.: Lucky Forward: The History of Patton's Third U.S. Army, p. 168.

86. Ogorkiewicz, R.M.: "Polish Cavalry in 1939", Royal Armoured Corps Journal, October 1959, p. 147. There were three Soviet cavalry corps in 1945 and two German cavalry divisions in 1944.

87. Letter from Broad to Rickard: see note 83 above.

1. Memorandum of the Secretary of State for War, Army Estimates for 1920-1921.

2. House of Commons Debates, Vol. 125, Col. 1356, 23 February 1920.

3. Ibid., Vol. 139, Col. 1288, 15 March 1921.

4. Ibid., Vol. 150, Col. 702, 13 February 1922.

5. House of Lords Debates, Vol. 54, Col. 637, 27 June 1923.

6. Question frcm Brig. Gen. E.L. Spears, House of Commons Debates, Vol. 170, Col. 1160, 4 March 1924.

7. Ibid., Vol 171, Cols. 111 and 115, 17 March 1924.

8. Memorandum of the Secretary of State for War, Army Estimates for 1925-1926.

9. House of Commons Debates, Vol. 193, Col. 78, 15 March 1926.

10. Memorandum of the Secretary of State for War, Army Estimates for 1928-1929.

11. House of Commons Debates, Vol. 214, Cols. 1264-1265, 8 March 1928.

12. Ibid., Vol. 225, Cols. 2214-2215, 28 February 1929.

13. Ibid., Vol. 237, Col. 82, 24 March 1930.

14. Ibid., Vol. 237, Col. 187, 24 March 1930.

15. Ibid., Vol. 249, Col. 1012, 10 March 1931.

16. Ibid., Vol. 250, Col. 293, 24 March 1931.

17. Ibid., Vol. 256, Col. 1453, 22 September 1931.

18. Memorandum of the Secretary of State for War, Army Estimates for 1932-1933.

19. Question from Brig. Gen. J.J.H. Nation, House of Commons Debates, Vol. 275, Col. 967, 7 March 1933.

20. Ibid., Vol. 275, Col. 1439, 9 March 1933.

21. Ibid., Vol. 276, Col. 210, 21 March 1933.

22. Ibid., Vol. 287, Col. 600, 15 March 1934.

23. Ibid., Vol. 287, Col. 715, 15 May 1934.

24. "It is clear that if there had been two British

armoured divisions instead of battalions, the whole German plan might have been paralyzed". Liddell Hart is here speaking of the British tank attack on the German flank from Vimy towards Cambrai on 21 May 1940. (Liddell Hart, B.H.: The Other Side of the Hill, p. 138)

Two things may be said about this claim. First, if there had been two armoured divisions, it is by no means certain that they would have had tanks worth using - the overwhelming majority of British tanks in 1940 were the useless light tanks, the ridiculous Infantry Tank Mark I, the lightly armoured Cruisers. Second, after causing some panic in the rear areas (but not too much at the scene of the attack), the British tanks were driven off by the German 88mm anti-aircraft/anti-tank guns. (See also Blaxland, G.: Destination Dunkirk, pp. 132-148). In my opinion, a great deal of Liddell Hart's attitudes towards the interpretation of the tank controversy were formed from this event: much of his post war writings (including and especially The Tanks) seems to me permeated with this spirit of "if only...". And it is perfectly understandable - after all, he had been saying that this would happen for years and it must have been galling to him to see his country's forces defeated by an enemy using his own ideas (or so he was told by Guderian in a British POW camp). However, I think that this sort of ironic approach to the tank controversy is too dependent on hindsight. I don't think it is fair to blame the generals of 1919-1933 for not being prepared for a war which they were, in effect, ordered not to think about.

25. Letter from Burnett-Stuart to Liddell Hart, 20 September 1932, Liddell Hart Archives, 1/132/9.

26. Letter from Liddell Hart to Burnett-Stuart, 7 October 1932, Liddell Hart Archives, 1/132/10. He did say in his answer "I have reason to know that if a few years ago Milne had framed a programme he would have found not merely a sympathetic, but eager reaction <from the politicians, presumably>.

27. "...if we do not soon produce machines capable of an achievement, at any rate approaching, that which we talk about in our schemes, the people who have been making this mental advance <in accepting the tank> will begin to think such machines cannot be produced, and they will again become sceptical and reaction will set in." Letter from Lindsay to Fuller, 11 September 1930, Liddell Hart Archives, Lindsay Papers 15/12/15.

BIBLIOGRAPHY

BIBLIOGRAPHICAL NOTE ON TANK SOURCES

I CONTEMPORARY SOURCES

1. Official Documents
2. Private Papers and Collections
3. Contemporary Opinion on the Controversy
   a In Journals
   b Elsewhere

II NON CONTEMPORARY SOURCES

III OFFICIAL HISTORIES

Bibliography
Bibliographical Note on Tank Sources

There are a number of problems associated with sources on tanks which are not found in many other historical sources.

1. Sources are especially hard to obtain although, with the reorganization of many archives, the situation is improving. In the British case, at least, many War Office documents have been destroyed.
2. Tanks are "high security" objects and information about them is usually classified for some years after their introduction. As a result, some tank books describe supposed models like the "Char 3C" which never existed but which are the result of intelligence errors.
3. In many other historical areas one's common sense may be a guide as to whether something is probable or not. Unfortunately, this will not work with tanks. Tanks have been built with a crew of eighteen men, or with a weight of 180 tons - indeed it was even felt worth while to seriously consider an atomic powered tank before realizing that shielding problems made such a thing impossible!
4. Even with the most meticulous effort, tank facts will vary. No two mass produced objects have exactly the same dimensions; no two guns have exactly the same characteristics.
5. The presence of amateurs interested in tanks has caused a never ending flow of what are best described as "picture books". In these the pictures are the selling point and the text is often studded with numerous errors and examples of incomplete research. Frequently the authors have depended upon similar efforts and the same errors pass from book to book.
6. Sources on tanks eschew the normal evidence of scholarship and I have never seen one with a footnote or other source for something said in the text.

Because of these problems, the only way to be certain about something connected with tanks is to do the work oneself. Nevertheless, one must often make reference to secondary sources. Unless one has an exact and detailed knowledge of the subject gathered over years of research, one must judge the secondary sources on internal evidence alone. Following are some points which may be used to guide this judgement.

1. Clear photographs of the model in question are fairly reliable. They should be of the highest possible quality and there should be as many as possible.
2. The better tank books have masses of detail and are always careful to distinguish between, say, a Vickers Medium Mark II and a Mark IIA. Most tank designs went through many changes and the books which carefully describe these changes inspire confidence by that evidence of careful research.
3. One source can corroborate another and such consistency can make one quite certain.

However, none of these points is enough in itself: photographs can and have been faked, incorrect detail can be given and two authors can both be wrong.

However, there exists at least a negative test. While many otherwise good tank sources may make small errors, there are some errors which show that the book is very suspect. An example is the "Char 3C" which seems to have been a German intelligence error in which one version of the French heavy tank Char 2C was elevated into a complete fictional series of super heavy tanks. This particular model has been well debunked by now but, even so, the "picture books" repeat the error. More relevant to British tanks of the period of this thesis are the Medium D and the Johnson Light Infantry Tank. As I have indicated, this is a matter on which little is known. However, the weight of the Medium D is known and books which give it as 20 tons are wrong. And so are those books which refer to the Light Infantry Tank as having weighed 17.5 tons. There are other errors which are the result of careless or incomplete research. The existence of one of these errors makes the rest of the book very suspect. How!

Nevertheless, internal evidence itself is not enough and an attitude of suspicion is required when assessing secondary works on tanks.

Sources for British Tank Designs, 1919-1933.

Major General Duncan's articles in British AFVs 1919-1940.

This is one of the best secondary sources. Duncan served in many of these tanks and he was the Curator of the RAC Tank Museum for some years.

Official Vehicle Manuals.

For self evident reasons, these are the best sources of all. Unfortunately they are available for the Vickers Medium only among the designs of the period.

Willoughby's Digests. (See Chapter 4, Note 54).

These represent all that remains of many War Office papers. Unfortunately, he seems to have confused the Light Infantry Tank with the Medium D. For that reason, if no other, the digests should be treated with caution but it is almost impossible to do without them.

Documents in the PRO and Hansard.

I have been able to get a number of details about tanks from these sources but so many of the War Office papers on the subject have disappeared that what one finds there is a matter of luck. There is much that is useful (particularly about performance) in the annual reports of the Mechanical Warfare Board but the Board was only created in 1928 and does not cover the whole of the period. The "Purple Primers" contain some useful material

mostly connected with the Vickers Medium and some of the early light tanks.

Liddell Hart: The Tanks, Vol. I.
Bearing in mind that Liddell Hart was arguing a case, there is no reason to suppose that he was incorrect in what he says about the tank designs. But he leaves many things out: a reader of the book would not be aware of the criticism which the Vickers Medium received from its users before the 1930's.

The Journals and Other Contemporary Sources.
There are many useful tidbits concerning the performance of the tanks. There are also details about foreign matters (especially anti-tank weapons) but these need to be accepted with caution. Papers in the Liddell Hart Centre for Military Archives are useful sources of pieces of information on the performance of the vehicles and frequently include valuable contemporary opinions on them. Fuller's publications are not very valuable on tank details because he does not seem to have been very interested in the mechanical side. Martel is better here although much of his writings are concerned with publicizing light tanks and tankettes. His In the Wake of the Tank is very useful because it is a contemporary summary of the tank developments written by one who had much first hand knowledge. I found Rowan-Robinson's two books of great value because they were written near the experiments of 1927/1928 and demonstrate the doubts about the future of the medium tank at that time.

With the above sources, it is possible to describe the tank designs and their characteristics with some accuracy and especially the most important one - the Vickers Medium. Other sources have also proved valuable.

Jones, Rarey and Icks.
This book suffers from the fact that it was written in the United States in 1933 and therefore all information about non-American tanks must be treated with scepticism because of security difficulties. For example, they describe the "Char 3C" but they may be excused because they could not have had access to accurate but secret information. The book is useful in its attempt to provide a summary of everything connected with tanks - history, designs and ancillary devices. It is a useful period document.

Chamberlain and Ellis
Their books are a valuable and almost unique supply of photographs. Unfortunately the text is not as good. For example they make many errors in their description of the Johnson designs.

Crow and Icks: Encyclopaedia of Tanks.
This is more or less an updated version of what was attepted in The Fighting Tanks of 1933. It too has some

errors (again on the Medium D) but is reasonably good.

Ogorkiewicz' two books.

One, Armoured Forces, is a history of tanks and tank formations with some discussion of engineering problems; the other, Design and Development of Fighting Vehicles, is a discussion of engineering problems and design matters connected with AFVs with some history. The first is a valuable survey of the field and the second, although more concerned with post Second World War developments, is a very useful and unique discussion of the problems which have been constant in tank design since "Little Willie" was made.

Two examples of "picture books" are Macksey and Batchelor's Tank and, much worse, Halle and Demand's Tanks. The first has a collection of errors - the Johnson designs, that Christie built a flying tank - and seems to be principally a frame for Batchelor's drawings. The second book is quite remarkable. It, like the other, prefers drawings to photographs (a suspicious sign in itself) and virtually every drawing has some error or other. Even that well illustrated model, the Vickers Medium, is represented by a drawing which contains no less than 23 errors by my count! Perhaps the outstanding error in the latter is a photograph of the American Shillelagh anti-tank missile equipped M-60 medium tank which is captioned "The first tank equipped for shooting down aircraft"!

I.1 Contemporary Sources, Official Documents

Public Record Office

WO32 Registered Papers, General Series
WO33 Reports and Miscellaneous Papers
WO163 War Office Council and Army Council
CAB2 Committee of Imperial Defence Minutes
CAB4 Papers of Committee of Imperial Defence
CAB21 Cabinet: Registered Files
CAB23 Cabinet Minutes
CAB53 Committee of Imperial Defence: COS Committee
CAB54 Committee of Imperial Defence: Deputy COS Committee
Index to Cabinet Conclusions

Parliament

House of Commons Debates, Volume 113 (1919) to Volume 280 (1933)
House of Lords Debates, Volume 34 (1919) to Volume 87 (1933)
Memoranda of the Secretary of State for War Relating to the Army Estimates from 1920/1921 to 1933/1934, published annually in Accounts and Papers, Air, Army
The Army Estimates from 1919/1920 to 1933/1934, published annually in Accounts and Papers, Air, Army

I.2 Contemporary Private Papers and Collections

a Liddell Hart Archives, States House, Medmenham, Bucks.

(NOTE: All references to the Liddell Hart Archives in the Notes, unless otherwise stated, are to Liddell Hart's papers)

Papers of Major General Sir Percy HOBART
Papers of Sir Basil LIDDELL HART
Papers of Major General George LINDSAY

b Centre for Military Archives, King's College, London

Papers of Lieutenant General Sir Charles BROAD
Papers of Major General John F.C. FULLER
Papers of Field Marshal Sir Archibald MONTGOMERY-MASSINGBERD

c The Library and Collection of the Royal Armoured Corps Tank Museum, Bovington Camp, Wareham, Dorset

NOTE: Throughout I have referred to the "Liddell Hart Archives" and to the "Centre for Military Archives, King's College" as if they were separate collections. Strictly speaking, this is misleading for these papers are now part of the Liddell Hart Centre for Military Archives. However, this collection is still split between States House and King's College and my dual system of reference is to be understood as a guide to the papers' physical location only.

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